FAA-E-2904
February 28, 1996

U.S. Department
of Transportation
Federal Aviation
Administration

U.S. Department
of Defense

U.S. Department Of Transportation
Federal Aviation Administration
and the
U.S. Department Of Defense

National Airspace System (NAS)
Subsystem Level Specification

for

Standard Terminal Automation Replacement System (STARS)

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3 REQUIREMENTS

3.1 Service Levels

3.1.1 Full Service Level (FSL)

3.1.1.1 ATC Operational Functionality. FSL shall include the data entry, data display and capabilities specified in Section 3.2.1, Air Traffic Control Operational Functions.

3.1.1.2 System Operational Functionality. FSL shall include the data entry, data display and capabilities specified in Section 3.2.2, System Operational Functions.

3.1.1.3 System Support Functionality. FSL shall include the data entry, data display and capabilities specified in Section 3.2.3, System Support Functions.

3.1.1.4 Concurrent Operation. ATC operational functionality, system operational functionality, and system support functionality shall operate concurrently to provide FSL.

3.1.1.5 Emergency Service Level (ESL) Resources Off-Line. The functionality and performance of FSL shall be maintained when ESL resources are off-line.

3.1.1.6 Performance. FSL performance shall conform to the requirements specified in Section 3.2.4, System Performance, while maintaining the resource reserves specified in Section 3.10, Computer Resources.

3.1.2 Emergency Service Level

3.1.2.1 ATC Display

3.1.2.1.1 Display of Target Data

3.1.2.1.1.1 Radar Coordinates. All target data and map data shall be displayed in radar coordinates.

3.1.2.1.1.2 Sensor Identification. The radar source in use shall be identified in ESL display.

3.1.2.1.1.3 Surveillance Target Display

3.1.2.1.1.3.1 Target Extent Symbol. ESL shall display a target extent symbol, indicating the target size scaled proportional to the resolution of the radar, centered at the target reported radar position in single sensor slant range only and tangential to the radar origin.

3.1.2.1.1.3.2 Target Position Symbol. ESL shall include display of the target position symbol indicating whether the return is (1) Mode C, Non-selected; (2) Mode C, Selected; (3) Non-Mode C, Non-selected; (4) Non-Mode C, Selected; and (5) search only targets.

2.2 Precedence of Documents. When the requirements of this document and referenced applicable documents are in conflict, this document shall have precedence over all documents referenced herein.

2.3 Availability of Documents. Government documents not included herewith may be obtained from the NAS Documents Office (ACM-620B) located at the FAA Technical Center, Atlantic City Airport, New Jersey 08405.

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AAS Static Information Format Agreements (ASIFAs) may be obtained from the Aeronautical Charting Automation Section, National Oceanic and Atmospheric Administration (NOAA)/National Ocean Service (NOS), 1301 East-West Highway, Bldg SSMC-4 Room 4531 M/S NCG135, Silver Spring, MD 20910-3281.

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1 SCOPE

1.1 Identification. This document constitutes the Standard Terminal Automation Replacement System (STARS) Subsystem Level Specification (SLS) assigned Federal Aviation Administration (FAA) configuration management number FAA-E-2904. This specification documents the functional, performance, design, construction, and support requirements for STARS. The requirement content of this specification defines the future terminal air traffic control automation system desired by the United States (US) Department of Transportation (DOT), FAA and the Department of Defense (DoD). These requirements satisfy the Terminal Automation System operational requirements documented in the FAA Operational Requirements Document (ORD) for STARS.

1.2 System Overview

1.2.1 Sponsorship. The STARS procurement activity is administered by the FAA. The STARS procurement activity is sponsored jointly by the FAA and the DoD. The automation system resulting from the procurement activity is intended for use by FAA-authorized and DoD-authorized organizations and personnel. FAA-authorized and DoD-authorized users will include personnel engaged in civil, commercial and military air traffic control operations, air traffic management, system maintenance and monitoring, user training, and system test and upgrade.

1.2.2 Background. The Automated Radar Terminal System (ARTS IIA/IIIA/IIIE) and DoD Programmable Indicator Data Processor (PIDP) architectures currently deployed to perform terminal air traffic control (ATC) at FAA and DoD sites are 15 to 30 years old. The ARTS/PIDP hardware and software baselines have been repeatedly "patched" over the last 15 to 30 years to resolve problems and to add new functional capabilities. Reserve processing and storage capacities needed to accommodate increasing traffic density and to implement new functionality are approaching full depletion. The existing ARTS/PIDP architectures will not support required future capacity expansion. Hardware and software reliability and availability continue to degrade. The current high cost of terminal system maintenance will continue to increase as hardware and software reliability continue to degrade.

1.2.3 Mission. The STARS mission is to provide automation to support control of air traffic within the FAA Terminal Radar Approach Control (TRACON), the Metroplex Control Facility (MCF) and DoD Terminal Control regions. The FAA and DoD intend to replace all terminal automation systems presently deployed at these facilities, including ARTS IIA/IIIA/IIIE, EARTS, and the DoD Radar ATC Facility-Direct Altitude and Identification Readout (RATCF-DAIR), and the PIDP systems, and TPX-42, with STARS beginning in 1998.

1.2.4 System Architecture. Figure 1 shows a top-level view of the system architecture which was used as a model to develop the requirements contained in this specification. This architecture portrays all major STARS subsystems and external interfaces which are required for the initial operating capability (IOC). Shaded elements of the figure indicate those external systems not within the scope of the STARS procurement.

1.2.4.1 Automation Subsystem. STARS will be an integrated subsystem of the FAA National Airspace System (NAS). The primary subsystem of STARS will be an all digital air traffic control automation system composed of integrated commercial-off-the-shelf (COTS) hardware, commercially available software (CAS), and air traffic automation specific software. The STARS automation subsystem will accept surveillance and other input data and process that data to provide air traffic control and system

maintenance information to system operators and external systems. STARS will support three data display functions: terminal air traffic control data display in the TRACON, terminal air traffic control data display in the tower, and maintenance support data display in several facilities (as described below).

Terminal air traffic control data will be displayed in the TRACON at all Terminal Controller Workstations (TCWs) and in the tower at all Tower Display Workstations (TDWs). Maintenance support data will be displayed at various facilities at all Monitor and Control Workstations (MCWs) and selected TCWs.

1.2.4.2 Remote Support Subsystems. As depicted in Figure 1, STARS will also consist of three remote support subsystems. The subsystem located at the STARS Central Support Complex (SCSC) will perform two functions. The field support function of the SCSC subsystem will be used to perform Program Technical Report (PTR) analysis and testing, hardware testing and analysis, system level adaptation, software baseline generation and configuration management. The software development function of the SCSC subsystem will be used to develop, modify and test software to resolve existing problems identified with the existing software baseline and to add new functionality.

The subsystem located at each of the nine Operational Support Facilities (OSFs) will be used to perform hardware and software maintenance, including site adaptation and site support, for up to 41 STARS automation subsystems. The interface between an OSF subsystem and the SCSC subsystem will be a wide-area network (WAN) supplied by the FAA. The interface between an OSF and a STARS automation subsystem site will be a bidirectional dial-up interface defined by the contractor. The OSF will be capable of interfacing with six STARS automation subsystems simultaneously. This interface will support the transfer of system software, system performance data, resource status data, diagnostic data, and system resource control data. Although not shown in the diagram, a contractor-defined dial up interface will exist to provide direct connectivity between the SCSC and any single selected STARS automation subsystem site. The SCSC will be capable of interfacing with 12 STARS automation subsystems simultaneously. All modems and leased lines will be supplied by the Government.

The subsystem located at each of the four to ten Operations Control Centers (OCCs) will be used to perform remote monitoring and control (RMC) of up to 80 STARS automation subsystems. The OCC subsystem will interface with the STARS automation subsystems via dedicated lines and modems supplied by the government. The OCC subsystem will also interface with a central data repository system located at the National Operations Control Center (NOCC). The NOCC system will be used to analyze and archive performance and status data collected from each site. The NOCC system is not a deliverable under the STARS procurement.

1.2.4.3 External System Interfaces. As a subsystem of the NAS, STARS must interface with several existing NAS subsystems to obtain the data necessary to perform terminal air traffic control automation processing. Each STARS automation subsystem will interface with one or more existing NAS en route systems using the existing message format and protocol to transmit and receive flight and control data. Initially, the NAS/STARS interface will also support data transfer between STARS automation subsystems using the NAS en route system as a message router. Multiple NAS interfaces will be required at IOC. A direct STARS/STARS interface will be implemented in the future to support local flight data processing, thereby reducing the NAS en route system processing load.

The STARS automation subsystem will interface with multiple existing ASR-9 short range digital radars, digitized ASR-8 short range analog radars, and new ASR-11 short range digital radars to obtain target data input for automation processing. STARS will also interface with multiple existing ARSR-1 and ARSR-2 long range analog radars via a Common Digitizer and ARSR-3 and ARSR-4 long range digital

radars directly.

The STARS automation subsystem will interface with the Enhanced Traffic Management System (ETMS) via a Traffic Management Unit (TMU) collocated at the TRACON or via a NAS en route system located at an Air Route Traffic Control Center (ARTCC). Track data generated by STARS will be transferred to the ETMS to support traffic flow monitoring and metering.

All existing terminal automation tower display systems will be replaced by STARS TDWs. The STARS automation subsystem will interface with each local and remote TDW providing air traffic control automation products to all existing towers (ATCTs) with this capability. Each interface will support bi-directional data transfer between the STARS automation subsystem and a TDW. Modems and leased lines required to interface to remote towers will be provided by the Government.

The STARS automation subsystem will interface to a standard time source system to obtain a time reference which is consistent and accurate. The standard time data will be used to ensure synchronization of data within, and between, the STARS automation subsystem and to "stamp" all recorded data. The interface will support unidirectional data transfer from the standard time system to the STARS automation subsystem.

Interfaces to new NAS subsystems currently required as preplanned product improvements (P3I) will occur through the Application Interface Gateway (AIG).

1.2.5 Concept of Operations

1.2.5.1 Air Traffic Control (ATC). STARS will be used by air traffic control specialists (ATCSs) to perform terminal radar air traffic control functions as defined in FAA Handbook 7110.65, "Air Traffic Control". The general roles and responsibilities of ATCSs will remain unchanged with the deployment of STARS. STARS will be used to support both search and beacon radar target identification, maintenance of target identity, radar separation, traffic and weather advisory services, and navigational assistance to participating aircraft. STARS will also provide full ATC operational functionality in tower cabs which is identical to that provided in the TRACON.

STARS will provide the coordination and data display functions required by both TRACON and tower ATC personnel. STARS will be used to effect both interfacility and intrafacility radar handoffs, and will include interfacility flight data functions in the existing ARTS baseline. STARS data display will include aircraft position data, aircraft status, flight plan information, and general information. STARS will continue to provide safety functions such as the conflict alert (CA), Mode-C intruder (MCI), and minimum safe altitude warning (MSAW). STARS will also support controller training. Supervisory and traffic management specialists will use STARS for operational oversight to support real-time air traffic control decision-making.

The data entry, data display, and capabilities to perform air traffic control will be provided by the Terminal Controller Position (TCP) at the TCW or TDW.

1.2.5.2 Maintenance

1.2.5.2.1 Hardware Maintenance. The Government will support the STARS hardware utilizing two levels of maintenance, site and depot. Site maintenance will consist of trained Government (DoD and FAA/Airway Facilities) technicians identifying failed line replaceable units (LRUs) using on-line diagnostics from the Monitor and Control (M&C) position. The failed LRU will be removed using procedures prescribed in commercial off-the-shelf, as well as technical manuals developed by the Contractor. Serviceable LRUs from a set of site spares will then be installed into the system to replace the failed LRU and return the system to full availability. The system will be certified by the M&C Operator. Failed LRUs will be returned to the depot. Depot repair of failed LRUs will be provided by the Prime Contractor. STARS will support the remote maintenance monitoring at the OCC (FAA only) to support centralized support and provide the capability to monitor system operation concurrent with ATC operations.

Second level hardware maintenance support is engineering support to assist the operational site in resolution of discrepancies that are beyond normal maintenance activities. It also provides engineering support for evaluation, approval, and implementation of system and hardware operational effectiveness enhancement. This support is provided by the operational support service (AOS).

The STARS Monitor and Control (M&C) capability will be used to monitor the status, configuration, and performance of system resources and to control startup, shutdown, restart, and reconfiguration of the system. The M&C will also be used to conduct fault diagnosis, fault isolation, hardware configuration management, software download and transition, and certification of system operations.

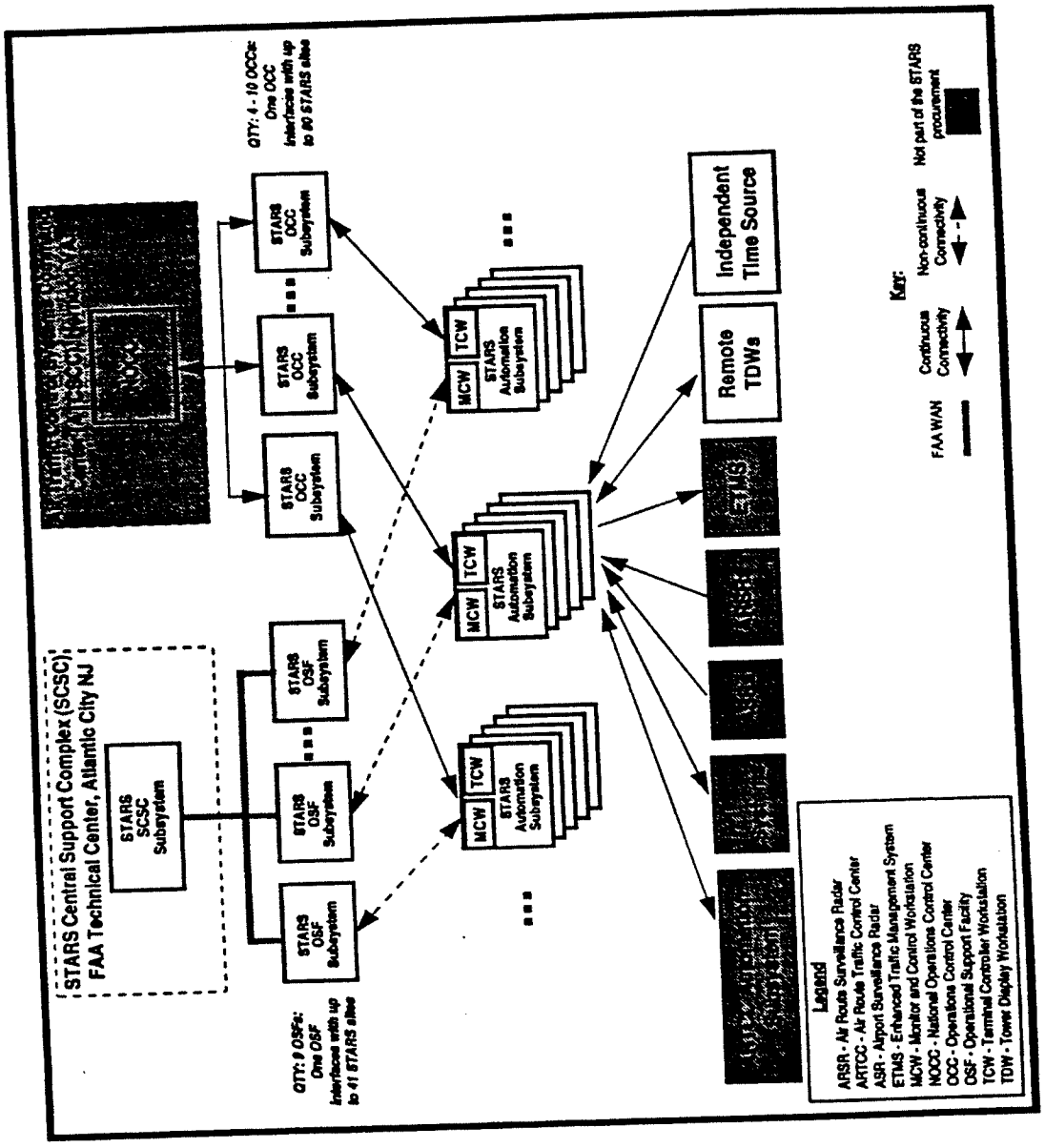
1.2.5.2.2 Software Maintenance

1.2.5.2.2.1 Software Maintenance Responsibilities. All adaptive, perfective, and corrective STARS software maintenance including site adaptation, will be maintained under the management of the FAA via maintenance personnel located at the SCSC as well as the OSFs.

Software maintenance responsibilities are summarized as follows:

- The FAA will have sole responsibility for defining, validating, implementing and testing site adaptation.
- The FAA will have primary responsibility for identification and resolution of PTRs relating to application software; any contractor will have secondary responsibility for PTRs relating to application software.
- The FAA will have primary responsibility for identification of PTRs relating to CAS; the contractor will have secondary responsibility for identification of PTRs and primary responsibility for resolution of PTRs relating to CAS.
- The FAA will have primary responsibility for identification, processing and implementation of Software Change Proposals (SCPs); the contractor will have secondary responsibility for SCPs.
- The FAA will have primary responsibility for release and validation of CAS; the contractor will have secondary responsibility for CAS.
- The FAA will have sole responsibility for configuration management of site adaptation, application software and CAS.
- The FAA will have primary responsibility for release and validation of new application software related to P3I; the contractor will have secondary responsibility for new application releases.

FIGURE 1 STARS Architecture



1.2.5.2.2.2 On-Site Software Maintenance. The STARS automation subsystem will be capable of receiving software releases from remote sites. The STARS automation subsystem will be capable of supporting the testing, verification, and validation of these software releases to assure they meet the requirements for operational use. These capabilities apply to all aspects of the STARS system such as operations, training, maintenance, and other software functionality or programs.

1.2.5.2.2.3 Off-Site Software Maintenance

1.2.5.2.2.3.1 Operational Support Facility (OSF). The STARS subsystem located at the OSF will be used by maintenance personnel to implement and configuration manage site adaptation data, and to test and validate site adaptation data and new software baseline releases prior to installation and implementation at the supported STARS sites. Initial support for site software problems including identification of PTRs will be performed at the OSF. In addition, the STARS subsystem located at the OSF will be capable of storing and executing previous, current and future software versions for up to 40 sites.

1.2.5.2.2.3.2 STARS Central Support Complex (SCSC). The SCSC subsystem is comprised of two distinct configurations, the Software Development Configuration (SDC) and the Field Support Configuration (FSC). The FSC functionality will be used to perform PTR analysis, hardware analysis, and system baseline testing. The FSC will replicate any fielded STARS configuration in order to support problem resolution and system testing. SDC functionality will be used to design and develop STARS automation software, perform system wide adaptation and configuration management, and provide data storage capabilities.

1.2.6 Pre-Planned Product Improvements (P3I). The STARS evolutionary functional development strategy requires that the design of STARS incorporate an open system architecture. This open system architecture will allow for the insertion of the additional capacity required to implement new functionality.

The currently identified pre-planned product improvements for STARS are:

- Surveillance Enhancements
- Surface Separation
- Improved Weather Display
- Data Link Communications
- Separation Assurance Enhancements
- Conflict Alert and Mode C-Intruder Alert Enhancements
- Terminal ATC Automation (TATCA)
- Traffic Management Enhancements
- Supplemental Flight Data Processing
- Free-Form Text
- Controller-Defined Airspace

1.2.7 Intended Life Cycle. The platform independent software and commercially available equipment of STARS will facilitate upgrading processing, memory, communications, and display capabilities in step with technology. These features will allow for an evolutionary STARS life-cycle with no defined obsolescence.

1.3 Document Overview. The format of this specification complies with the System/Subsystem Specification (SSS) Data Item Description (DID) DI-IPSC-81431 as found in MIL-STD-498, "Software Development and Documentation". This specification was developed with the aid of an automated requirements management and analysis tool to facilitate structured decomposition of the requirements, resulting in every testable requirement ("shall" statement) being assigned a unique indentured paragraph number.

Section 2 of this document provides explicit references for any documentation cited within this specification. Section 3 sets forth the requirements for the STARS including:

- Service Levels (3.1)
- System Capabilities (3.2)
- System External Interfaces (3.3)
- System Internal Interfaces (3.4)
- System Internal Data (Not Applicable) (3.5)
- Adaptation (3.6)
- Safety (3.7)
- Physical Security (Not Applicable) (3.8)
- System Environment (3.9)
- Computer Resources (3.10)
- System Quality Factors (3.11)
- Design And Construction Constraints (3.12)
- Personnel-Related Requirements (3.13)
- Training (Not Applicable) (3.14)
- Logistics-Related Requirements (Not Applicable) (3.15)
- Additional Requirements (3.16)
- Packaging (Not Applicable) (3.17)
- Precedence and Criticality of Requirements (Not Applicable) (3.18)

Section 4 identifies the Qualification Provisions including a Verification Requirements Traceability Matrix (VRTM). Section 5 (System-to-Subsystem Requirements Traceability) is not applicable to this subsystem level specification. Section 6 contains the Acronyms and Abbreviations and the Glossary of Terms. All terms used in this specification are to be interpreted according to the definitions provided in the Glossary of Terms.

2 REFERENCED DOCUMENTS

2.1 Specifications, Standards, and Publications.
The following documents form a part of the specification to the extent specified herein.

2.1.1 FAA Specifications.

FAA-E-2312A Console, TRACON/RAPCON, January 15, 1976.

FAA-G-2100F Electronic Equipment, General Requirements, November 15, 1993.

NAS-IC-21052100 Standard Terminal Automation Replacement System (STARS)/Enhanced Traffic Management System (ETMS) ICD (FINAL), February 15, 1996.

NAS-IC-21058217 Terminal/En Route Interfacility Interface ICD (FINAL), February 12, 1996.

NAS-IC-34130001 En Route Surveillance Radar/Terminal Air Traffic Control System ICD (FINAL), February 26, 1996.

NAS-IR-34120001 Terminal Surveillance Radar/Terminal Air Traffic Control System IRD (DRAFT), February 26, 1996.

NAS-MD-581 FDIO Software ICD, September 23, 1987.

2.1.2 FAA Standards.

None.

2.1.3 FAA Publications.

Operational Concept Document for the Standard Terminal Automation Replacement System (STARS): Airway Facilities (DRAFT), November 1, 1995.

FAA Operational Requirements Document for Standard Terminal Automation Replacement System (STARS), June 18, 1995.

FAA Advanced Automation System Static Information Format Agreement, Pixel Data (ASIFA-P), August 27, 1993.

FAA Advanced Automation System Static Information Format Agreement, Vector Data (ASIFA-V), September 1, 1993.

2.1.4 FAA Orders.

FAA Order 1600.54B FAA Automated Information System Security Handbook, February 7, 1989.

FAA Order 1600.66 FAA Telecommunications and Information Systems Security Policy, July 27, 1994.

FAA Order 6000.15 General Maintenance Handbook for Airway Facilities, August 15, 1991.

FAA Order 6000.27 Transmittal of Maintenance Philosophy Steering Group (MPSG) Report, June 1, 1979.

FAA Order 6480.7C Airport Traffic Control Tower and Terminal Radar Approach Control Facility Design Guidelines, April 28, 1995.

FAA Order 7110.65J Air Traffic Control, July 20, 1995.

FAA Order 7210.3K Facility Operation and Administration, September 16, 1993.

2.1.5 Military Specifications.

None.

2.1.6 Military Standards.

MIL-STD-1472D and Note 2 Human Engineering Design Criteria for Military Systems, Equipment and Facilities, September 23, 1992.

MIL-STD-454N Standard General Requirements for Electronic Equipment, June 30, 1992.

MIL-STD-498 Software Development and Documentation, December 5, 1994.

2.1.7 Military Publications.

None.

2.1.8 Federal Specifications.

None.

2.1.9 Federal Standards.

Federal Information Processing Standard (FIPS) 119-ADA Ada language processors, March 13, 1995.

Federal Information Processing Standard (FIPS) 127-2 Database Language SQL and Change Number 1 Database Language SQL, October 4, 1993.

Federal Information Processing Standard (FIPS) 146-2 (Draft), Profiles for Open Systems Internetworking Technologies (POSIT), June 20, 1995.

Federal Information Processing Standard (FIPS) 151-2 Portable Operating System Interface (POSIX) - System Application Program Interface (C Language), May 12, 1993.

Federal Information Processing Standard (FIPS) 156 Information Resource Dictionary System, August 3, 1992.

Federal Information Processing Standard (FIPS) 158-1 The User Interface Component of the Applications

Portability Profile, October 8, 1993.

Federal Information Processing Standard (FIPS) 160-C C language processors, August 24, 1992.

2.1.10 Federal Publications.

FCC 47CFR Part 15 Federal Communications Commission Code of Federal Regulations, October 1, 1993.

2.1.11 Industry Specifications.

None.

2.1.12 Industry Standards.

EIA-449 General Purpose 37-Position and 9-Position Interface for Data Terminal Equipment and Data Circuit Terminating Equipment Employing Serial Binary Data Interchange, February 1990.

EIA-530A High Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment March 1987.

EIA/TIA-232E Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange, July 1991.

ISO 9000-3 American National Standard for Quality Management and Quality Assurance Standards Part 3: Guidelines for the application of ISO 9001 to the development, supply, and maintenance of software, 1991.

ISO 9001 American National Standard for Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing, 1987.

NFPA70 National Electrical Code, 1996.

Postscript Manual, January 1992; Updates to Postscript Manual, 2nd Edition, 7 July 1995.

UL1950 Underwriters Laboratory Standards for Safety of Information Technology Equipment, Including Electrical Business Equipment, November 10, 1994.

2.1.13 Other Documents.

Proposed EUROCONTROL Radar Data Exchange (ASTERIX) standard:
Part 1, All purpose Structured EUROCONTROL Radar Data Exchange, Reference 005-1-93.
Part 2, Transmission Of Monoradar Data, Reference, 005-2-93.
Part 3, Transmission of Monoradar Derived Weather Information, Reference 005-3-93.

MTR 95W0000071 Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements, August 1995.

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3 REQUIREMENTS

3.1 Service Levels

3.1.1 Full Service Level (FSL)

3.1.1.1 ATC Operational Functionality. FSL shall include the data entry, data display and capabilities specified in Section 3.2.1, Air Traffic Control Operational Functions.

3.1.1.2 System Operational Functionality. FSL shall include the data entry, data display and capabilities specified in Section 3.2.2, System Operational Functions.

3.1.1.3 System Support Functionality. FSL shall include the data entry, data display and capabilities specified in Section 3.2.3, System Support Functions.

3.1.1.4 Concurrent Operation. ATC operational functionality, system operational functionality, and system support functionality shall operate concurrently to provide FSL.

3.1.1.5 Emergency Service Level (ESL) Resources Off-Line. The functionality and performance of FSL shall be maintained when ESL resources are off-line.

3.1.1.6 Performance. FSL performance shall conform to the requirements specified in Section 3.2.4, System Performance, while maintaining the resource reserves specified in Section 3.10, Computer Resources.

3.1.2 Emergency Service Level

3.1.2.1 ATC Display

3.1.2.1.1 Display of Target Data

3.1.2.1.1.1 Radar Coordinates. All target data and map data shall be displayed in radar coordinates.

3.1.2.1.1.2 Sensor Identification. The radar source in use shall be identified in ESL display.

3.1.2.1.1.3 Surveillance Target Display

3.1.2.1.1.3.1 Target Extent Symbol. ESL shall display a target extent symbol, indicating the target size scaled proportional to the resolution of the radar, centered at the target reported radar position in single sensor slant range only and tangential to the radar origin.

3.1.2.1.1.3.2 Target Position Symbol. ESL shall include display of the target position symbol indicating whether the return is (1) Mode C, Non-selected; (2) Mode C, Selected; (3) Non-Mode C, Non-selected; (4) Non-Mode C, Selected; and (5) search only targets.

3.1.2.1.1.3.3 Target Position History. ESL shall include display of aircraft radar position histories.

3.1.2.1.1.4 Aircraft Information. When the filter criteria are satisfied, ESL shall include display of target beacon code and altitude, barometric pressure corrected when less than flight level 180, at the end of a target leader for targets reporting these values.

3.1.2.1.1.5 Filters

3.1.2.1.1.5.1 Selected Beacon Codes. ESL shall include display of aircraft information for targets with beacon codes that correspond to up to ten (10) beacon code blocks.

3.1.2.1.1.5.2 All Beacon Codes Selected. Upon TCP selection, ESL shall include display of aircraft information for all targets.

3.1.2.1.1.5.3 Altitude Filter. ESL shall include display of aircraft information for beacon code-selected targets that are between altitude filter limits.

3.1.2.1.1.6 Radar Range Rings. ESL shall include display of symmetric circular radar range rings at least in 2, 5, 10, or 20 nm intervals centered on any selected point.

3.1.2.1.1.7 Maps. ESL shall include simultaneous or individual display at the TCW and TDW of a minimum of 10 digital maps associated with the radar source.

3.1.2.1.1.8 Weather

3.1.2.1.1.8.1 Displayed Levels. ESL shall include the display at the TCW and TDW of at least two distinguishable levels of processed weather mapped from six available levels.

3.1.2.1.1.8.2 Targets in Weather. Aircraft targets shall be visible through any selected levels of displayed weather data.

3.1.2.1.2 Display of Lists and Tabular Data

3.1.2.1.2.1 Display Coordinates. All lists and tabular data shall be displayed in display coordinates.

3.1.2.1.2.2 System Data. ESL shall include display of the following: barometric pressure setting for the source radar, source radar identification, beacon code blocks, and altitude limits.

3.1.2.1.2.3 Compass Rose. ESL shall include display at the TCW and TDW of a compass rose, oriented toward magnetic north, providing directions at 10 degree increments.

3.1.2.1.3 ESL ATC Display Control

3.1.2.1.3.1 Radar Source Selection

3.1.2.1.3.1.1 ESL Radar Source Selection on TCW. Terminal Controller Position (TCP) input shall select the radar source of target position and data for ESL display at each TCW.

3.1.2.1.3.1.2 ESL Radar Source Selection on Local TDW. TCP input shall select the single radar source of target position and data for ESL display at each local TDW.

3.1.2.1.3.1.3 ESL Radar Source Selection on Remote TDW. TCP input shall select the single radar source of target position and data from either a direct radar interface or from the automation subsystem for ESL display at each remote TDW.

3.1.2.1.3.2 Brightness Control. TCP input shall select from a minimum of 4 levels of brightness independently for groups of text and graphics presented on an individual TCW and TDW.

3.1.2.1.3.3 Character Size Control. TCP input shall select from a minimum of 5 different character sizes for ESL text display.

3.1.2.1.3.4 Number of Target Position Histories. TCP input shall enable, disable and select the number, up to at least four, of aircraft radar position histories displayed at each TCW and TDW.

3.1.2.1.3.5 Beacon Code Block Selection. TCP input shall select beacon code blocks at each TCW and TDW.

3.1.2.1.3.6 Selection of All Beacon Codes. TCP input shall control the selection of all beacon codes for display at each TCW and TDW.

3.1.2.1.3.7 Altitude Filter Control. TCP input shall control the limits of the altitude filter at each TCW and TDW.

3.1.2.1.3.8 Range Display Control. TCP input shall select a display range from 6 nm to the maximum coverage area without modifying character size or line width.

3.1.2.1.3.9 Display Center. TCP input shall relocate the display center to any geographic point within the source radar coverage area.

3.1.2.1.3.10 Range Ring Display Control. TCP input shall select range ring interval, center and display offset at each TCW and TDW.

3.1.2.1.3.11 Map Selection. TCP input shall select digital maps to be displayed at a TCW and TDW.

3.1.2.1.3.12 Barometric Pressure. TCP input shall specify the barometric setting for the source radar.

3.1.2.1.3.13 Weather Level Selection. TCP input shall select weather levels displayed at a TCW and TDW.

3.1.2.1.3.14 Enable/Disable Compass Rose. TCP input shall select and inhibit compass rose display at a TCW and TDW.

3.1.2.2 ESL Monitor and Control Functionality

3.1.2.2.1 Resource Status Display. ESL shall include display of ESL resource status at the Monitor and Control Position (MCP).

3.1.2.2.2 Diagnostics. ESL shall include MCP-initiated diagnostics for all ESL hardware resources.

3.1.2.2.3 Restart. ESL shall include MCP-initiated ESL restart.

3.1.2.2.4 Certification. ESL shall include certification as described in Section 3.2.2.4., Certification

3.1.2.3 ESL Performance. To the extent applicable to ESL functionality, ESL performance shall conform to the requirements specified in Section 3.2.4, System Performance, while maintaining the resource reserves specified in Section 3.10, Computer Resources.

3.1.2.4 FSL Resources Off-Line. The functionality and performance of ESL shall be maintained when FSL resources are off-line.

3.1.3 Service Level Display

3.1.3.1 ATC Operational Service Level Selection. The ATC operational service level to be displayed shall be selectable at the TCP.

3.1.3.2 System Operational Service Level Selection. The system operational service level to be displayed shall be selectable at the MCP.

3.1.3.3 Available Service Levels Indicated. The available service levels shall be indicated at the TCP and the MCP.

3.1.4 Recovery

3.1.4.1 Recovery From Power Failure. Recovery from a power failure shall be automatic once power is restored.

3.1.4.2 Recovery from System Resource Failure. Recovery from system resource failure shall be automatic.

3.1.4.3 State After Recovery. Recovery from power failures and system resource failures shall return the system to the processing activities, including data processing and presentation, in existence prior to the power or resource failure.

3.2 System Capabilities

3.2.1 Air Traffic Control Operational Functions

3.2.1.1 Surveillance

3.2.1.1.1 Surveillance Sources

3.2.1.1.1.1 Multiple Surveillance Sources. Aircraft position, weather, test, and status data shall be accepted simultaneously from multiple surveillance systems.

3.2.1.1.1.2 Redundant Interfaces. Surveillance data shall be accepted from both a primary interface and an identical backup interface for each surveillance system.

3.2.1.1.1.3 Data Selection. Data shall be automatically selected from either the primary interface or the identical backup interface for each surveillance system.

3.2.1.1.2 Target Data

3.2.1.1.2.1 Target Types. Beacon and search target data shall be accepted.

3.2.1.1.2.2 Registration Error Correction. Registration error correction factors shall be applied to beacon and search targets.

3.2.1.1.2.3 Collimation Error Correction. Collimation error correction factors shall be applied to search targets.

3.2.1.1.2.4 Target Data Filtering. Targets that lie outside of a geographic area defined by adaptable parameters shall be discarded.

3.2.1.1.2.5 Coordinate Conversion. Target data from multiple surveillance systems shall be converted to a common coordinate system.

3.2.1.1.2.6 Mode C Altitude

3.2.1.1.2.6.1 Mode C Altitude Pressure Correction. Validated Mode C altitude in beacon target reports shall be corrected for barometric variations from the standard mean sea level pressure of 29.92 inches of mercury.

3.2.1.1.2.6.2 Source Data For Pressure Correction. Source data for pressure corrections shall be the altimeter setting for the geographic region.

3.2.1.1.2.7 Permanent Echo Search Targets. Permanent echo search targets shall be detected and made available for display.

3.2.1.1.2.8 Parrot Targets. Fixed beacon transponder targets shall be detected and made available for display.

3.2.1.1.2.9 Test Targets. Test targets from surveillance systems shall be made available for display.

3.2.1.1.2.10 Reflected Beacon Target Suppression. False beacon targets due to mainbeam reflections of known reflecting surfaces shall be detected and suppressed.

3.2.1.1.2.11 Ringaround Beacon Target Suppression. False beacon targets received on side-lobes shall be detected and suppressed.

3.2.1.1.3 Surveillance Weather

3.2.1.1.3.1 Weather Messages. Weather data shall be made available for display.

3.2.1.1.3.2 Weather Filtering. Weather messages shall be filtered to discard data that lie outside of a geographic area defined by adaptable parameters.

3.2.1.1.3.3 Coordinate Conversion. Weather data from multiple surveillance systems shall be converted to a common coordinate system.

3.2.1.1.4 Strobe Messages. Beacon and search strobe data shall be accepted.

3.2.1.1.5 Real Time Quality Control (RTQC) Messages. Beacon and search RTQC messages including sector marks shall be made available for system status monitoring

3.2.1.1.6 Status And Radar Identification Messages. Radar status messages and radar identification messages from all surveillance systems shall be made available for system status monitoring.

3.2.1.1.7 Radar Data Reporting

3.2.1.1.7.1 Radar Data Counts. The number of target reports by target type and the number of target report errors shall be counted for each radar system and made available for system status and performance monitoring.

3.2.1.1.7.2 Radar Error Messages. Radar error messages received from each surveillance system shall be detected and made available for system status and performance monitoring.

3.2.1.2 Tracking

3.2.1.2.1 General

3.2.1.2.1.1 Target Types. Search-only, beacon-only, and radar-reinforced beacon targets shall be tracked.

3.2.1.2.1.2 Beacon Target Loss. Tracking of beacon tracks shall continue using search-only targets during loss of beacon targets.

3.2.1.2.1.3 Radar Sources

3.2.1.2.1.3.1 Single Radar Source. Targets shall be tracked using reports from a single radar.

3.2.1.2.1.3.2 Multiple Radar Sources

3.2.1.2.1.3.2.1 Tracking. Targets shall be tracked using data received concurrently from multiple radars, including targets from multiple radars for the same aircraft.

3.2.1.2.1.3.2.2 Adapted Geographic Areas. The surveillance coverage area shall be divided into adaptable surveillance data geographic areas.

3.2.1.2.1.3.2.3 Selection of Surveillance Data. Each adapted surveillance data geographic area shall be associated with an adapted radar preference hierarchy which determines the source preference of surveillance data to be used for tracking.

3.2.1.2.1.3.3 Radar Types. Targets received concurrently from both short and long-range radars shall be tracked.

3.2.1.2.2 Correlation. Correlation shall be performed on all targets received to determine whether the target corresponds to an existing track.

3.2.1.2.3 Track Update

3.2.1.2.3.1 Correlated Track Update. The position and velocity of the correlated track shall be smoothed and predicted using position data from correlated target reports.

3.2.1.2.3.2 Uncorrelated Track Update. The position and velocity of the uncorrelated track shall be predicted using previously determined position and velocity.

3.2.1.2.3.3 Consecutive Non-Correlations. Tracks that fail to correlate for an adaptable number of consecutive update cycles shall be inhibited from further updating.

3.2.1.2.3.4 Uncorrelated Hand-off Track Update. Arrival/overflight hand-off tracks that have auto-acquired from an interfacility flight plan and have not correlated for more than an adaptable number of update cycles shall be updated with position information contained in the Track Update (TU) message.

3.2.1.2.3.5 Track Update Message Interruption. When TU messages are interrupted and recorrelation has not occurred, the track shall only be updated when TUs are again received or recorrelation occurs.

3.2.1.2.4 Automatic Track Initiation

3.2.1.2.4.1 Uncorrelated Target Reports. Target reports which do not correlate with an existing track shall automatically initiate a new track.

3.2.1.2.4.2 Search-Only Targets. Automatic track initiation on search-only targets shall be inhibited when the target position is inside adapted clutter areas, the track speed is outside an adapted range, or the scan-to-scan change in speed exceeds an adapted threshold.

3.2.1.2.5 Altitude Tracking

3.2.1.2.5.1 Altitude Track Update. Altitude for correlated tracks shall be smoothed and predicted using Mode C altitude data from correlated target reports.

3.2.1.2.5.2 Unreasonable Mode C Data. Correlated tracks reporting Mode C altitude with altitude change rates that exceed an adapted value shall be predicted using previously determined altitude data.

3.2.1.2.5.3 Missing Mode C Data. Altitude for uncorrelated tracks or for correlated tracks with missing Mode C altitude data shall be predicted using previously determined altitude data.

3.2.1.2.6 Automatic Acquisition

3.2.1.2.6.1 Track Association. A correlated track shall be linked with a flight plan that is eligible for automatic acquisition or an associated track which is inhibited from updating.

3.2.1.2.6.2 Auto-Acquisition Eligibility. Discrete beacon code tracks and flight plans that satisfy adaptable geographic position and altitude criteria shall be eligible for automatic acquisition.

3.2.1.2.6.3 Inhibit For Duplicate Codes. Automatic acquisition shall be inhibited for flight plans with duplicate beacon codes.

3.2.1.2.6.4 Non-Updating Tracks. Associated beacon tracks that are inhibited from updating shall remain eligible for automatic acquisition.

3.2.1.2.6.5 Special Automatic Acquisition

3.2.1.2.6.5.1 Adapted Beacon Codes. Automatic acquisition shall occur when the beacon code of the unassociated track matches a special automatic adapted beacon code.

3.2.1.2.6.5.2 Adaptable Flight Data. Flight data for special automatic acquisition shall be adaptable for each beacon code including aircraft identity, aircraft type, control position, scratch pad, and flight status.

3.2.1.2.7 Automatic Drop

3.2.1.2.7.1 Disassociate Track In Auto-Drop Area. Associated arrival tracks in an adaptable auto-drop area shall be disassociated from its flight plan unless adaptable ground speed and altitude parameters are exceeded or the track is under the control of another facility.

3.2.1.2.7.2 Flight Plan Retention. Flight plans for arrival tracks which have been disassociated in an adapted arrival autodrop area shall be retained for an adapted period of time.

3.2.1.2.7.3 Track Re-acquisition

3.2.1.2.7.3.1 Re-acquisition. A disassociated track inhibited from updating shall be eligible for automatic acquisition when it has a discrete beacon code.

3.2.1.2.7.3.2 Arrival Track Re-acquisition. An arrival track which has been disassociated in a an adapted arrival auto-drop area shall be eligible for re-acquisition only if it has exited the auto-drop area for the arrival airport.

3.2.1.2.7.3.3 Interfacility Arrival Track. An interfacility arrival track that has auto-acquired and subsequently exits radar coverage and is under control of an adjacent facility shall be disassociated and its flight plan retained for an adapted time period.

3.2.1.2.7.3.4 Disassociate Track. An associated departure track shall be disassociated from its flight plan when the track enters an adapted airport departure drop zone for the departure airport, unless the track has been inhibited from auto-drop.

3.2.1.3 Conflict Alert (CA) /Mode C Intruder (MCI)

3.2.1.3.1 General

3.2.1.3.1.1 Conflict Alert. Conflicts shall be detected between all associated Mode C altitude reporting aircraft track pairs.

3.2.1.3.1.2 Mode C Intruder. Conflicts shall be detected between all associated/unassociated Mode C altitude reporting aircraft track pairs.

3.2.1.3.1.3 Conflict Alert Surveillance Sources. Conflicts shall be detected for track pairs when the tracks' position data are generated from single or multiple surveillance sensors.

3.2.1.3.1.4 Look-Ahead Time. Look-ahead time for predicted conflicts shall be adaptable up tp a maximum of 120 seconds.

3.2.1.3.1.5 Conflict Parameters. All conflict alert parameters that define separation and geographic criteria shall be adaptable.

3.2.1.3.2 Conflict Types

3.2.1.3.2.1 Current Conflict. Conflicts shall be detected using current track position and altitude data.

3.2.1.3.2.2 Predicted Conflict. Conflicts shall be detected using predicted track position, altitude, and altitude change rate data.

3.2.1.3.2.3 Maneuvering Conflicts. Conflicts shall be detected for maneuvering aircraft using track position, turn indication, altitude and altitude change rate data.

3.2.1.3.2.4 Parallel Approach Conflicts. Conflicts shall be detected between aircraft pairs on parallel approach in airport areas adapted for parallel runways.

3.2.1.3.3 Conflict Alert Areas. Conflict alert parameters shall be adaptable in three-dimensional geographic areas.

3.2.1.3.4 Conflict Alert Display

3.2.1.3.4.1 Output Conflicts. Detected conflicts shall be made available for display.

3.2.1.3.4.2 Conflict Reporting Duration. Conflicts shall be reported for an adapted minimum duration time.

3.2.1.3.4.3 Alert Data. Alert data for a conflict presented at multiple TCPs shall be identical at all positions.

3.2.1.3.5 Event Display. Reports of conflict alerts shall be made available for ATC operational event display.

3.2.1.4 Final Monitor Aid (FMA)

3.2.1.4.1 Zone Definitions

3.2.1.4.1.1 Active Monitored Zone (AMZ). The location and dimensions of the rectangular AMZ volume shall be adaptable, with a default location such that the AMZ longitudinal axis is co-linear with the runway axis; a default longitudinal range of 30 nautical miles from the final approach end of the runway to 5 nautical miles beyond the departure end of the runway; and a default vertical range from 50 feet to 11,000 feet above ground level.

3.2.1.4.1.2 No Transgression Zone (NTZ). The location and dimensions of the NTZ shall be adaptable, with a default orientation such that it is parallel with two adjacent runways being used for parallel approaches; a default location such that it is centered between two adjacent runways being used for parallel approaches; and a default width of 2,000 feet.

3.2.1.4.1.3 Navigational Error Zone (NEZ). The location and dimensions of the NEZ shall be adaptable, with a default orientation such that it is parallel with two adjacent runways being used for parallel approaches; a default location such that it is centered between two adjacent runways being used for parallel approaches with the position of the inner end of the NEZ coincident with the outer end of the NTZ; and a default width of 2,000 feet.

3.2.1.4.1.4 Normal Operating Zone (NOZ). The location and dimensions of the NOZ shall be adaptable, with the default parameters such that it is a volume of airspace around the final approach course centerline and not a part of any NEZ or NTZ.

3.2.1.4.2 Operation

3.2.1.4.2.1 Track Eligibility. A track shall be eligible for monitoring by FMA when it is within an AMZ.

3.2.1.4.2.2 Zone Penetration. For each eligible track, an FMA alert shall be generated when the corresponding aircraft is in an active NEZ or NTZ, based on current track information.

3.2.1.4.2.3 Predicted Zone Violation. For each eligible track, an FMA alert shall be generated when the corresponding aircraft is predicted to enter an active NEZ or NTZ, based on current track position and velocity information, and an adapted look-ahead time with a maximum value of 20 seconds.

3.2.1.4.2.4 Missing Surveillance Data Condition. For each eligible track, an FMA alert shall be generated when the track has not correlated for an adaptable number of consecutive scans.

3.2.1.4.2.5 Runway Mistake Detection

3.2.1.4.2.5.1 Track Stabilization. FMA shall determine the stabilization of each eligible track based on: current track position and an adaptable lateral distance from the approach course centerline; current track heading and an adaptable angle of the centerline heading of the approach course; an adaptable value for the number of scans to establish track stabilization; and an adaptable value for the number of scans to lose track stabilization.

3.2.1.4.2.5.2 Runway Mismatch. For each eligible track, an FMA alert shall be generated when a track has been determined to be stabilized on an approach and the assigned runway for the aircraft is different.

3.2.1.4.2.5.3 Runway Designator. For each eligible track, an FMA alert shall be generated when a track has been determined to be stabilized on an approach and the assigned runway for an aircraft is invalid or the aircraft has no assigned runway.

3.2.1.4.2.6 Alert Suppression

3.2.1.4.2.6.1 Outside NOZ. When an FMA alert has been generated for either a predicted zone violation or a zone penetration, and when the track position has never been reported in the Normal Operating Zone for the assigned runway, the FMA alert shall be suppressed.

3.2.1.4.2.6.2 Approaching Adjacent NOZ. When an FMA alert has been generated for either a predicted zone violation or a zone penetration, and when the aircraft is moving toward the NOZ of a runway adjacent to the assigned runway based on current position and velocity, the FMA alert shall be suppressed.

3.2.1.4.2.6.3 Aircraft Not Assigned to Monitored Runways. When an FMA alert, other than that generated by a runway mistake detection, has been generated for an aircraft that is not assigned to one of the currently monitored parallel runways, the FMA alert shall be suppressed.

3.2.1.4.2.6.4 Aircraft Not Assigned to Any Runway. When an FMA alert, other than that generated by a runway mistake detection, has been generated for an aircraft that has no runway assignment, the FMA alert shall be suppressed.

3.2.1.4.3 Position Enable/Disable

3.2.1.4.3.1 FMA Enable/Disable. FMA shall be enabled and disabled on command for each individual TCW.

3.2.1.4.3.2 Activate/Deactivate Zone. Selected FMA zones shall be activated and deactivated on command for each FMA-enabled TCW.

3.2.1.4.4 Print Messages

3.2.1.4.4.1 Event Display. Reports of FMA alerts shall be made available for ATC operational event display.

3.2.1.4.4.2 Enable/Disable Actions. A message shall be printed for each FMA enable and disable action, indicating the source and type of action.

3.2.1.5 Minimum Safe Altitude Warning (MSAW)

3.2.1.5.1 General Terrain Monitor

3.2.1.5.1.1 Monitor Altitude. Mode C tracked aircraft shall be monitored for conflict with terrain and obstructions.

3.2.1.5.1.2 Altitude Source. The altitude data used by the MSAW function shall be generated from the Mode C reported altitude or from the manually-entered assigned altitude when Mode C data from the aircraft is not available.

3.2.1.5.1.3 Vertical Profile. Tracked aircraft shall be monitored along a two-segment path using the track's current and predicted altitude to compute a vertical profile and compare the profile against an adapted terrain map.

3.2.1.5.1.4 First Segment. The first segment shall begin at the track's current position and extend to a position predicted using the track's estimated altitude change rate and an adapted time parameter.

3.2.1.5.1.5 Second Segment. The second segment shall begin at the end of the first segment, extend to the altitude of the highest terrain or to an adapted time parameter, whichever occurs first and project the track's altitude assuming an adapted climb angle.

3.2.1.5.1.6 Terrain Map Resolution. The resolution of the terrain map shall be adaptable from 0.5 nm to 2 nm.

3.2.1.5.1.7 Map Formats. Digital maps shall be received in one of the following MSAW NOAA formats:

a. OMNIPLOT/Line GP
b. OMNIPLOT/Line XY
c. Standard Interchange Format (SIF) Vector
d. SIF Raster

3.2.1.5.2 Approach Path Monitor

3.2.1.5.2.1 Monitor Approach Altitude. Tracked aircraft altitude shall be monitored for conflict with terrain or obstructions along adaptable approach paths.

3.2.1.5.2.2 Monitor For Altitude Boundary. Tracked aircraft altitude on adaptable approach paths shall be monitored for descent below an adaptable altitude using the track's current and predicted altitude.

3.2.1.5.3 MSAW Volumes

3.2.1.5.3.1 Aural Alarm Volume. An aural alarm shall sound for a low altitude violation on associated aircraft within an adaptable volume.

3.2.1.5.3.2 Aural Alarm Inhibit Volume. The aural alarm shall be inhibited for low altitude violation on tracks within an adaptable volume.

3.2.1.5.3.3 General Terrain Inhibit Volume. Reports of low altitude violations shall be inhibited for tracks within an adaptable volume.

3.2.1.5.3.4 Departure Inhibit Volume. Tracked departure aircraft in an adaptable departure inhibit volume shall be suppressed from MSAW alert display if they are departures from the associated airport.

3.2.1.5.4 MSAW Display

3.2.1.5.4.1 Low Altitude Alerts. Reports of low altitude violations shall be made available for display.

3.2.1.5.4.2 Identical Alerts. Low altitude alerts displayed at multiple TCPs shall be identical at all positions.

3.2.1.5.4.3 Alert Duration. Once a low altitude alert has been displayed at a TCP, it shall remain until the violation condition ceases.

3.2.1.5.4.4 Minimum Alert Time. An alert shall remain for an adapted minimum time duration.

3.2.1.5.5 Inhibit Codes. Reports of low altitude violations shall be inhibited for tracked aircraft with an adaptable beacon code, code segment or code block.

3.2.1.5.6 Event Display. Reports of low altitude violations shall be made available for ATC operational event display.

3.2.1.6 Converging Runway Display Aid (CRDA)

3.2.1.6.1 Geometry

3.2.1.6.1.1 Target Reference. The target reference line shall be an adaptable vector that has its origin at the adaptable target reference point and is associated with a specific qualification region, with the default target reference point location at the convergence point of two converging runways, and a default orientation of the target reference line such that it corresponds to the final approach for one of the two converging runways.

3.2.1.6.1.2 Image Reference. The image reference line shall be an adaptable vector that has its origin at the adaptable image reference point and is associated with a specific qualification region, with the default image reference point location at the convergence point of two converging runways, and a default orientation of the image reference line such that it corresponds to the final approach of the runway opposite that which is used for the target reference line.

3.2.1.6.1.3 Qualification Region. The qualification region shall be an adaptable region defined by a horizontal polygon, with a default shape of a trapezoid, a default location such that it is collinear with the associated target reference line, and a default orientation such that the shorter parallel side of the trapezoid is closer to the associated target reference point than the longer parallel side.

3.2.1.6.1.4 Application. An application shall include two qualification regions, the two target reference points and lines associated with the qualification regions, and the two image reference points and lines associated with the qualification regions.

3.2.1.6.2 Operation

3.2.1.6.2.1 Track Eligibility. A track shall be eligible for CRDA when it is within an active qualification region and its heading or any of the data field values equal values set in adaptation.

3.2.1.6.2.2 Standard Ghosting Range Location. The ghost target shall be located such that the distance of the ghost target to the image reference point along the image reference line equals the distance of the actual target to the target reference point along the target reference line.

3.2.1.6.2.3 Standard Ghosting Lateral Location. The ghost target shall be located such that the lateral relationship of the ghost target to the image reference line is the same as the relationship of the actual target to the target reference line.

3.2.1.6.2.4 Data Field Entries. On command, up to three data block data field entries shall be used to force track eligibility for CRDA for an approaching aircraft, with the default value for the initial data field entries set to the runway to be used by that aircraft.

3.2.1.6.3 Position Enable/Disable

3.2.1.6.3.1 CRDA Enable/Disable. CRDA shall be enabled and disabled on command for each individual TCP.

3.2.1.6.3.2 Activate/Deactivate Application. Each individual qualification region within an application, and its associated target and image reference lines and points, shall be activated and deactivated independently on command for each enabled TCP.

3.2.1.6.4 Print Messages. A message shall be printed for each commanded enable/disable action.

3.2.1.7 Controller Automated Spacing Aid (CASA)

3.2.1.7.1 CRDA Functionality. CASA shall include all of the functionality required for CRDA, in addition to the functionality specified for CASA.

3.2.1.7.2 Qualification Region. The qualification region shall include a maximum altitude that is selected at either an adapted constant altitude or at an adapted distance above and parallel to the glideslope, and a floor that is selected at either an adapted constant altitude or at an adapted distance below and parallel to the glideslope.

3.2.1.7.3 Mirror Image Ghosting. On command, for a given application, the lateral relationship of the ghost target to the image reference line shall be the opposite of the target of the aircraft to the target reference line.

3.2.1.7.4 Ghosting On Target Line. On command, for a given application, CASA shall generate a ghost target on the same centerline as the target aircraft.

3.2.1.7.5 Ghosting On Parallel Target Line. On command, for a given application, CASA shall generate a ghost target on a centerline parallel to the centerline of the target aircraft.

3.2.1.7.6 Print Messages. A message shall be printed for each commanded enable/disable action and CASA option, indicating the source and type of action.

3.2.1.8 Flight Data Processing

3.2.1.8.1 Terminal Computer Identification Assignment (TCID). A TCID number shall be assigned to received interfacility flight plans and TCP-entered VFR interfacility flight plans.

3.2.1.8.2 Beacon Code Banks. A minimum of four subsets of multiple, adaptable banks of beacon codes shall be available for assignment to intrafacility flight plans.

3.2.1.8.3 Flight Plan Entered at the TCP

3.2.1.8.3.1 Time Default. When the Estimated Time of Arrival (ETA) or Proposed Time of Departure (PTD) is not provided with flight data entered at the TCP, the current system time shall be assigned as the ETA or PTD.

3.2.1.8.3.2 Flight Data Default. When optional flight plan parameters are not entered at the TCP, adaptable default values shall be assigned.

3.2.1.8.4 TCP To Receive Flight Plan Data

3.2.1.8.4.1 Flight Plans Entered at the TCP

3.2.1.8.4.1.1 TCP Specified. For a flight plan entered at the TCP, when a TCP is specified, the specified position shall be assigned the flight plan unless the specified position is consolidated.

3.2.1.8.4.1.2 Specified TCP Consolidated. For a flight plan entered at the TCP, when the specified TCP is consolidated, the position with which the specified position is consolidated shall be assigned the flight plan.

3.2.1.8.4.1.3 TCP Not Specified. For a flight plan entered at the TCP, when no TCP is specified for a TCP-entered flight plan, the entering TCP shall be assigned the flight plan unless the entering position is consolidated.

3.2.1.8.4.1.4 Entering TCP Consolidated. For a flight plan entered at the TCP, when no TCP is specified and the entering TCP is consolidated, the position with which the entering position is consolidated shall be assigned the flight plan.

3.2.1.8.4.2 Interfacility Flight Plans. For both enroute and non-enroute system flight plans, the TCP to receive a flight plan shall be determined by matching field elements in the Flight Plan message, selected via adaptation, to corresponding parameters that define current configuration and current consolidation.

3.2.1.8.5 Flight Plan Creation For Formation Break-up. Separate flight plans shall be created by incrementing the formation flight leader's ACID and generating a new beacon code for each of the flight elements, when requested via input at the TCP.

3.2.1.8.6 Terminate Storage of Flight Plan Data. When a track is dropped by the system, storage of associated flight plan data shall be terminated.

3.2.1.8.7 Handoff Processing

3.2.1.8.7.1 Interfacility

3.2.1.8.7.1.1 Interfacility Destination TCP Handoff. The destination TCP for an interfacility handoff shall be determined by matching field elements in the Flight Plan message, selected via adaptation, to corresponding parameters that define current configuration and current consolidation unless the TCP is specified in the initiate transfer message.

3.2.1.8.7.1.2 TCP Specified in Initiate Transfer Message. The TCP specified in the InitiateTransfer message shall be used as the destination TCP for an interfacility handoff unless the position specified is consolidated.

3.2.1.8.7.1.3 Interfacility Consolidated TCP. When the TCP specified in the Initiate Transfer message is consolidated, the position with which it is consolidated shall be the destination TCP for an interfacility handoff.

3.2.1.8.7.1.4 Handoff Redirection. Redirection of a handoff from an ARTCC, or of a handoff from an adjacent TRACON for which interfacility data transfer messages are routed via the en route automation system, to another TCP shall be accomplished without having to accept the handoff at the current TCP.

3.2.1.8.7.2 Intrafacility

3.2.1.8.7.2.1 Intrafacility Destination TCP Handoff. The destination TCP for an intrafacility handoff shall be determined by matching field elements in the Flight Plan message, selected via adaptation, to corresponding parameters that define current configuration and current consolidation unless a TCP is specified by input at the TCP.

3.2.1.8.7.2.2 TCP Input. The TCP specified by input at the TCP shall be used as the destination TCP for an intrafacility handoff unless the specified position is consolidated.

3.2.1.8.7.2.3 Intrafacility Consolidated TCP. When the TCP specified by input at the TCP is consolidated, the position with which it is consolidated shall be used as the destination TCP for an intrafacility handoff.

3.2.1.8.7.3 Effect of Handoff Accept Action. Control of tracks and flight plan information shall be transferred to the handoff destination when a handoff accept action is taken on a flight that (1) is in handoff status and (2) is not controlled by the position performing the accept action.

3.2.1.8.7.4 Effect of Handoff Recall Action. When a handoff recall action is taken on a flight that (1) is in handoff status and (2) is controlled by the position performing the recall action, the referenced flight plan shall be removed from handoff status.

3.2.1.8.7.5 Manual Handoff Processing

3.2.1.8.7.5.1 Interfacility Manual Handoff Processing

3.2.1.8.7.5.1.1 Flights With ARTCC Flight Plans

3.2.1.8.7.5.1.1.1 Manual Initiation With Specification Of TCP. Transfer of control of tracks and flight information to a specified position shall be performed for manually initiated handoffs of flights to an ARTCC or flights with ARTCC flight plans to an adjacent TRACON when the handoff is accepted.

3.2.1.8.7.5.1.1.2 Manual Initiation Without Specification Of TCP. Transfer of control of tracks and flight information shall be performed for manually initiated handoffs, of flights to an ARTCC or flights with ARTCC flight plans to an adjacent TRACON without specification of a controlling TCP when the handoff is accepted.

3.2.1.8.7.5.1.1.3 Interfacility Manual Acceptance of Flights with ARTCC Flight Plans. Transfer of control and display of tracks and flight information shall be performed for manually accepted handoffs of flights from an ARTCC or of flights with ARTCC flight plans from an adjacent TRACON when the handoff is accepted.

3.2.1.8.7.5.1.2 Interfacility Manual Handoff of Flights Using Non-En Route System Flight Plans

3.2.1.8.7.5.1.2.1 Manual Initiation. Transfer of control of tracks and flight information to an adjacent TRACON shall be performed for manually initiated handoffs of flights using flight plans which are not from the NAS en route system when the handoff is accepted.

3.2.1.8.7.5.1.2.2 Manual Acceptance. Transfer of control of tracks and flight information from an adjacent TRACON shall be performed for manually accepted interfacility handoffs of flights using flight plans that are not from the NAS en route system when the handoff is accepted.

3.2.1.8.7.5.1.3 Overflight Rejection in Interfacility Manual Handoff. All interfacility handoff attempts of overflights shall be rejected when the reject option is set in adaptation.

3.2.1.8.7.5.2 Intrafacility Manual Handoff Processing

3.2.1.8.7.5.2.1 Manual Initiation. Transfer of control and display of tracks and flight information shall be performed for manually initiated intrafacility handoffs when the handoff is accepted.

3.2.1.8.7.5.2.2 Manual Acceptance. Transfer of control and display of tracks and flight information shall be performed for manually accepted intrafacility handoffs when the handoff is accepted.

3.2.1.8.7.5.3 Handoff Acceptance Prohibition

3.2.1.8.7.5.3.1 Handoff Via Implied Command. Handoff acceptance actions performed via an implied command shall be prohibited when the track is not being updated with STARS radar information.

3.2.1.8.7.5.3.2 Track Beyond Adaptable Range. Handoff acceptance actions shall be prohibited when the referenced track is beyond an adaptable range from the source radar.

3.2.1.8.7.6 Automatic Handoff Processing

3.2.1.8.7.6.1 Automatic Interfacility Handoff Initiation Processing

3.2.1.8.7.6.1.1 Flights With Filed ARTCC Flight Plans. Automatic initiation of interfacility handoffs shall be performed for departures and overflights with ARTCC flight plans.

3.2.1.8.7.6.1.2 Conditions for Interfacility Automatic Initiation of Handoff Processing. Automatic initiation of an interfacility handoff shall occur when flight plan/track conditions match adapted parameters.

3.2.1.8.7.6.2 Automatic Intrafacility Handoff Processing

3.2.1.8.7.6.2.1 Auto-Initiation. Automatic intrafacility handoffs with automatic initiation shall be performed for any flight.

3.2.1.8.7.6.2.2 Auto-Acceptance. Automatic intrafacility handoffs with automatic acceptance shall be performed for any flight.

3.2.1.8.7.6.2.3 Conditions for Intrafacility Automatic Handoff Processing

3.2.1.8.7.6.2.3.1 Auto-Initiation. Automatic initiation of an intrafacility handoff shall occur when flight plan/track conditions match adapted parameters.

3.2.1.8.7.6.2.3.2 Auto-Acceptance. Automatic acceptance of an intrafacility handoff shall occur when flight plan/track conditions match adapted parameters.

3.2.1.8.7.6.3 Default Settings for Enabling Disabling Automatic Handoff Processing. Adaptable default settings for automatic handoff processing enabling and disabling shall be used when STARS is initiated.

3.2.1.8.8 TRACON Sectorization

3.2.1.8.8.1 Terminal Areas. Each TRACON shall include up to eight terminal areas.

3.2.1.8.8.2 Terminal Area Configuration Plan. Each terminal area shall have an associated adaptable configuration plan.

3.2.1.8.8.3 Configuration Plans. The number of configuration plans shall be adaptable.

3.2.1.8.8.4 Minimum Number of Configuration Plans. No less than eighty (80) adaptable configuration plans shall be available for each TRACON.

3.2.1.8.8.5 Configuration Plan Available at Coldstart. An adaptable configuration plan shall be available when sectorization is performed during a coldstart.

3.2.1.8.8.6 Resectorization

3.2.1.8.8.6.1 Terminal Area Independence. Changing configuration plans in a terminal area shall be accomplished without affecting configurations in other terminal areas.

3.2.1.8.8.6.2 Flight Plan Information and Track Reassignment. When resectorization is performed, (1) flight plan information for flights on which tracks have not been acquired and (2) future flight plan information and tracks shall be reassigned to TCPs based on the TCP assignment under the new configuration plan.

3.2.1.8.8.6.3 No Effect On Current Flight Plans and Tracks. When resectorization is performed, no change in assignment shall be made on flight plans on which tracks have been acquired.

3.2.1.8.8.6.4 Resectorization Results in Deconsolidation. When resectorization is performed, all consolidated positions shall be deconsolidated except for positions for which the new configuration does not assign flight plans.

3.2.1.8.8.6.5 Partial Resectorization. All unassociated and future flights arriving or departing over designated fix(es) shall be reassigned to a specified TCP when a partial resectorization is performed.

3.2.1.8.9 Consolidating Positions

3.2.1.8.9.1 Full Consolidation

3.2.1.8.9.1.1 Transfer of Track and Flight Plan Control and Display. Control and display of all tracks and active, inactive and future flight plan information shall be transferred from one TCP to another when full consolidation is performed.

3.2.1.8.9.1.2 Transfer of Flight Plan Processing Data. All flight plan processing data directed to or forced to the transferring TCP shall be passed to the TCP receiving the full consolidation.

3.2.1.8.9.1.3 Exclusion of VFR Track and Flight Plan Control and Display. Through adaptation, (1) control and display of VFR tracks and flight plan information and (2) VFR flight plan processing data directed to or forced to the transferring TCP, shall be excluded from being transferred when full consolidation is performed.

3.2.1.8.9.2 Basic Consolidation

3.2.1.8.9.2.1 Transfer of Track and Flight Plan Control and Display. Control and display of current tracks and all flight plan information shall be transferred from one TCP to another with TCP input when basic consolidation is performed.

3.2.1.8.9.2.2 Transfer of Flight Plan Processing Data. All flight plan processing data directed to or forced to the transferring TCP shall be passed to the TCP receiving the basic consolidation.

3.2.1.8.9.3 Limited Consolidation

3.2.1.8.9.3.1 Transfer of Track and Flight Plan Control and Display. When limited consolidation is performed, control and display of tracks and information from (1) all flight plans assigned to the transferring TCP, but not currently being tracked, and (2) all future flight plans shall be transferred from one TCP to another unless a system action is taken which specifically designates that information is to be received by the transferring position.

3.2.1.8.9.4 Deconsolidation. A previous consolidation shall be negated when deconsolidation is performed.

3.2.1.9 Interfacility Data Transfer (IFDT)

3.2.1.9.1 Enabling and Disabling Interfacility Data Transfer

3.2.1.9.1.1 Results of Enabling - Flight Plan Deletion. When the interfacility data transfer function is enabled, all inactive flight plans of interfacility origin shall be selectively deleted by operator input.

3.2.1.9.1.2 Results Of Disabling Interfacility Data Transfer. When the interfacility data transfer function is disabled, receipt and transmission of interfacility data transfer messages shall end, except for Test Data and Data Test messages.

3.2.1.9.2 Message Processing. Interfacility data messages shall be processed as specified in the Terminal/En Route Interfacility ICD, NAS-IC-21058217.

3.2.1.9.3 Enhanced Traffic Management Messages. Enhanced Traffic Management messages transferred between STARS and the TMU shall be processed as defined in the Standard Terminal Automation Replacement System (STARS)/Enhanced Traffic Management System (ETMS) ICD, NAS-IC-21052100.

3.2.1.10 Air Traffic Control Operational Data Entry

3.2.1.10.1 TCP Entry. All command entries shall be accepted and processed at the TCP.

3.2.1.10.2 Implied Controller Entries. TCP input shall employ all available context-sensitive information to expedite repetitive system entries.

3.2.1.10.3 Macro Command. Adaptable macro commands shall execute multiple TCP entries via a single command entry.

3.2.1.10.4 General Validation Criteria

3.2.1.10.4.1 Operator Authority. The entering operator class, as defined in adaptation, shall be verified for authority to perform the requested command.

3.2.1.10.4.2 Command Logic Override. When entered, a logic override shall permit a TCP to perform controller actions on an aircraft which is allocated to another TCP for control actions.

3.2.1.10.4.3 Duplication Within Entry. The entry content shall be checked to verify that entered values do not contain any duplication.

3.2.1.10.4.4 Format Errors. Data which is being entered into the system shall be verified for the correct format.

3.2.1.10.4.5 Validity. All information entered shall be checked for content validity.

3.2.1.10.4.6 Parameter Bounds. Entered data values shall be verified to be within adaptable parameter bounds.

3.2.1.10.4.7 Duplicate ACID. The TCP shall be notified when making entries involving an aircraft or flight plan with a duplicate ACID.

3.2.1.10.4.8 Duplicate Beacon. The TCP shall be notified when making entries involving an aircraft or flight plan with a duplicate beacon code.

3.2.1.10.5 Control of Data Blocks

3.2.1.10.5.1 Pointout

3.2.1.10.5.1.1 Pointout. TCP input shall force the pointout of an aircraft to an adapted data block type on the TCW(s) and TDW(s) of specified TCP(s).

3.2.1.10.5.1.2 Pointout - Recall. TCP input shall terminate the pointout of a selected aircraft by the pointout initiator.

3.2.1.10.5.1.3 Pointout Acknowledge. TCP input from the pointout receiver shall accept the pointout with the option to initiate a handoff from the pointout initiator to the pointout receiver.

3.2.1.10.5.2 Control Operations

3.2.1.10.5.2.1 Arrival Fix Areas. TCP input shall modify, enable and disable auto-acquisition ranges for arrival tracks within one or more geographic areas.

3.2.1.10.5.2.2 Initiate Control. TCP input shall manually associate an active track with flight data based upon ACID, discrete assigned beacon code or data list line identified, and optionally entered :

a. activity status including active or inactive
b. request for automated beacon code bank assignment
c. controller assigned beacon code
d. scratch pad data
e. aircraft type
f. assigned altitude data

3.2.1.10.5.2.3 Suspend Track. TCP input shall suspend the display of a track's data block.

3.2.1.10.5.2.4 Activate Suspended Track. TCP input shall re-display a suspended track.

3.2.1.10.5.2.5 Enable Automatic Acquisition. TCP input shall enable and disable automatic acquisition for a track in suspend or inactive flight plan status.

3.2.1.10.5.2.6 Terminate Control - Single Track. TCP input shall terminate flight data from an active track or an inactive flight plan.

3.2.1.10.5.2.7 Terminate All Tracks. TCP input shall terminate all aircraft flight data under the control of a selected position.

3.2.1.10.5.2.8 Track Reposition. TCP input shall transfer flight data from one track to another track.

3.2.1.10.5.3 Handoff

3.2.1.10.5.3.1 Initiate. TCP input shall initiate an aircraft handoff to another controller position based upon the identification of the controller position to receive the handoff and the identification of the target aircraft.

3.2.1.10.5.3.2 Recall. TCP input shall cancel a handoff based upon identification of the aircraft to be recalled by the sending TCP.

3.2.1.10.5.3.3 Forced Recall. TCP input shall unconditionally recall an aircraft in handoff based upon identification of the aircraft to be recalled by the sending TCP.

3.2.1.10.5.3.4 Accept. TCP input shall accept an aircraft in handoff based upon identification of the aircraft by the receiving TCP.

3.2.1.10.5.3.5 Forced Accept. TCP input shall unconditionally accept an aircraft in handoff based upon identification of the aircraft by the receiving TCP.

3.2.1.10.5.3.6 Automatic Handoff

3.2.1.10.5.3.6.1 Automatic Handoff Initiate - Aircraft. TCP input shall enable and disable automatic handoff initiation processing for a specified aircraft.

3.2.1.10.5.3.6.2 Automatic Handoff Accept - Aircraft. TCP input shall enable and disable automatic handoff acceptance processing for a specified aircraft.

3.2.1.10.5.3.6.3 Automatic Handoff Initiate - TCP. TCP input shall enable and disable automatic handoff initiation processing for a specified TCP.

3.2.1.10.5.3.6.4 Automatic Handoff Accept - TCP. TCP input shall enable and disable automatic handoff acceptance processing for a specified TCP.

3.2.1.10.5.3.7 Redirection of Handoff. TCP input shall redirect a handoff from an ARTCC to a specified TCP and override the handoff to the ARTCC determined position.

3.2.1.10.5.4 Request Range and Heading. TCP input shall request range and heading from a selected aircraft to a specified fix or airport.

3.2.1.10.5.5 Data Block Force. TCP input shall enable and disable the display of an adapted data block type for any specified target at the entering TCP.

3.2.1.10.6 Control of Flight Data

3.2.1.10.6.1 Automatic Flight Plan Generation. TCP input shall generate a flight plan for a selected aircraft using the existing data block information.

3.2.1.10.6.2 Display Flight Data. TCP input shall display flight data for a selected aircraft.

3.2.1.10.6.3 Intrafacility Flight Data Entry. TCP input shall enter intrafacility flight data consisting of an ACID and optionally:

a. beacon code
b. controlling position identifier
c. entry/exit fix data
d. status including arrival, departure, overflight or VFR
e. estimated time of arrival
f. proposed time of departure
g. scratch pad data
h. aircraft type
i. requested altitude

3.2.1.10.6.4 Modify Intrafacility Flight Data. TCP input shall modify the following intrafacility flight data for an aircraft identified by the ACID, discrete beacon code, pointer selection or data list line identifier:

a. ACID
b. beacon code
c. controlling position identifier
d. entry/exit fix data
e. status including arrival, departure, overflight or VFR
f. estimated time of arrival
g. estimated time of departure
h. scratch pad data
i. aircraft type
j. assigned altitude including for aircraft actively being controlled
k. requested altitude

3.2.1.10.6.5 VFR Interfacility Flight Data Entry. TCP input shall enter VFR interfacility flight data for an aircraft identified by ACID, entry/exit fix data and optionally:

a. aircraft category
b. aircraft type
c. assigned altitude
d. controlling position identifier

3.2.1.10.6.6 Flight Data - Formation Breakup. TCP input shall select a formation flight leader and formation aircraft for automatic creation of flight plans for the selected aircraft.

3.2.1.10.6.7 Manually Entered Departure Flight Data. TCP input shall uniquely identify manually entered departure flight data that requires facility coordination along with the flight data origin.

3.2.1.10.6.8 Request Flight Data. TCP input shall request the transfer of flight plan information from the ARTCC for a specified track.

3.2.1.10.6.9 Flight Plan - Retransmit. TCP input shall retransmit a VFR flight plan when the ARTCC rejects a VFR flight plan and indicates an error.

3.2.1.10.7 Control of Displayed Data

3.2.1.10.7.1 Converging Runway Display Aid (CRDA)

3.2.1.10.7.1.1 CRDA Application. TCP input shall select and inhibit a CRDA application for processing at a specified TCW and TDW.

3.2.1.10.7.1.2 CRDA Special Aircraft - Force. TCP input shall select and inhibit the unconditional display of CDRA special data block symbology for all aircraft or a selected aircraft at a TCW and TDW.

3.2.1.10.7.1.3 CRDA Special Aircraft - Associated Aircraft. TCP input shall select and inhibit the display of CDRA special data block symbology for a selected associated aircraft.

3.2.1.10.7.1.4 CRDA Special Aircraft - TCW. TCP input shall select and inhibit the display of CRDA special data block symbology for all eligible aircraft at the entering TCW and TDW.

3.2.1.10.7.1.5 CRDA Display Options. For an active CRDA application, the TCP shall select and inhibit the display of the following:

a. image reference point
b. image reference line
c. target reference point
d. target reference line
e. associated qualification regions
f. adapted information from the parent data block of a CRDA special data block.

3.2.1.10.7.2 Controller Automated Spacing Aid (CASA)

3.2.1.10.7.2.1 Mirror Image Ghosting. TCP input shall select and inhibit mirror image ghosting at the specified TCW and TDW.

3.2.1.10.7.2.2 Target Reference Line Ghosting. TCP input shall select and inhibit ghosting on the target reference line at the specified TCW and TDW.

3.2.1.10.7.2.3 Parallel Target Reference Line Ghosting. TCP input shall select and inhibit ghosting on the parallel target reference line at the specified TCW and TDW.

3.2.1.10.7.2.4 Terminate CASA Special Aircraft Symbology. TCP input shall terminate CASA special data block symbology for all aircraft at the entering TCW and TDW.

3.2.1.10.7.2.5 CASA Application. TCP input shall select and inhibit a CASA application for processing at a specified TCW and TDW.

3.2.1.10.7.2.6 CASA Special Aircraft - TCW. TCP input shall select and inhibit the display of CASA special data block symbology for all eligible aircraft at the entering TCW and TDW.

3.2.1.10.7.2.7 CASA Special Aircraft - Force. TCP input shall select and inhibit the unconditional display of CASA special data block symbology for all aircraft or a selected aircraft at a TCW and TDW.

3.2.1.10.7.2.8 CASA Display Options. For an active CASA application, the controller shall select and inhibit the display of the following:

a. image reference point
b. image reference line
c. target reference point
d. target reference line
e. associated qualification regions
f. adapted information from the parent data block of a CASA special data block.

3.2.1.10.7.3 Final Monitor Aid (FMA)

3.2.1.10.7.3.1 FMA - TCW Enable/Disable. TCP input shall enable or disable FMA processing for a specified TCW and TDW.

3.2.1.10.7.3.2 FMA Runway. TCP input shall select and inhibit a runway to be monitored at the entering TCW and TDW.

3.2.1.10.7.3.3 Caution/Warning Alerts. TCP input shall select and inhibit aircraft from a FMA caution or warning alert.

3.2.1.10.7.3.4 Active Monitored Zones (AMZs). TCP input shall activate and deactivate AMZs at each TCW and TDW.

3.2.1.10.7.3.5 FMA NTZ and NEZ. TCP input shall independently and dynamically activate and deactivate the NTZs and NEZs for the approach path that is being monitored.

3.2.1.10.7.4 CA/MCI Inhibit. TCP input shall select and inhibit CA/MCI alert for selected aircraft pairs, any specified TCW and TDW, any specified TCP, and any specified track.

3.2.1.10.7.5 MSAW Alert Inhibit. TCP input shall select and inhibit MSAW alert for a specified aircraft, a specified TCW and TDW, or a specified TCP.

3.2.1.10.7.6 Altimeter. TCP input shall select and inhibit the display of the altimeter(s) on a TCW and TDW.

3.2.1.10.7.7 Automatic Terminal Information System (ATIS). TCP input shall select and inhibit the display of manually entered ATIS(s) data.

3.2.1.10.7.8 Unique General Information. TCP input shall enter, modify, and display general information messages consisting of an associated identifier and at least 12 associated alphanumeric characters of optional data.

3.2.1.10.7.9 Altitude Restriction. TCP input shall select, inhibit, and relocate altitude restriction information for display on specified TCWs and TDWs.

3.2.1.10.7.10 Geographic Restriction. TCP input shall select, inhibit, and relocate geographic restriction information for special areas of activity for display on specified TCWs and TDWs.

3.2.1.10.7.11 Emergency Information. TCP input shall select and inhibit the display of emergency information, as defined in adaptation, for a selected aircraft.

3.2.1.10.7.12 Hospital Information Display. TCP input shall select and inhibit the display of hospital information, as defined in adaptation.

3.2.1.10.7.13 Hospital Location. TCP input shall select and inhibit the display of a hospital's geographic location.

3.2.1.10.7.14 Beacon Code Readout

3.2.1.10.7.14.1 Single Track. TCP input shall select and inhibit the display of the beacon code of a single track.

3.2.1.10.7.14.2 All Tracks - TCW. TCP input shall select and inhibit the display of the beacon code of all tracks on a TCW and TDW.

3.2.1.10.7.14.3 Adapted Beacon Code Banks. TCP input shall select and inhibit the display of the beacon code of tracks using beacon codes within adapted beacon code banks.

3.2.1.10.7.15 Parrot Display. TCP input shall select and inhibit the display of parrot symbology on a TCW and TDW.

3.2.1.10.7.16 Permanent Echo. TCP input shall select and inhibit the display of permanent echoes on a TCW and TDW.

3.2.1.10.7.17 Quicklook. TCP input shall select and inhibit the simultaneous viewing of one up to all active TCP's data blocks on the entering TCW and TDW.

3.2.1.10.7.18 Filters

3.2.1.10.7.18.1 Altitude Filter - Associated. TCP input shall select and inhibit the filtering of the display of the data blocks for associated aircraft based on TCP entered altitudes.

3.2.1.10.7.18.2 Altitude Filter - Unassociated. TCP input shall select and inhibit the filtering of the display of data blocks for unassociated aircraft based on TCP entered altitudes.

3.2.1.10.7.18.3 Beacon Code Filter. TCP input shall select and inhibit the display of special data block symbology for aircraft transmitting codes within ten selectable beacon code blocks or discrete beacon codes.

3.2.1.10.7.18.4 Beacon Code Filter-Unassociated. TCP input shall select and inhibit the display of special data block symbology for unassociated aircraft transmitting codes within ten selectable beacon code blocks or discrete beacon codes.

3.2.1.10.7.18.5 Display Filter Settings. TCP input shall select and inhibit the display of all filter settings.

3.2.1.10.7.19 Select Mode 2. TCP input shall select the display of the reported Mode 2 code for a selected aircraft.

3.2.1.10.7.20 Hold. TCP input shall place an aircraft in hold until released by another TCP input.

3.2.1.10.7.21 Coordination Information

3.2.1.10.7.21.1 Coordination Messages. TCP input shall create coordination messages for flights by selecting at a minimum the ACID or beacon code.

3.2.1.10.7.21.2 Coordination Message Composition. Coordination messages shall have the option to incorporate selections from a TCP data list and a 15 character field for TCP entered data.

3.2.1.10.7.21.3 Coordination Message Editing. Displayed coordination information shall be edited by a TCP input and made available for use in creating revised coordination messages.

3.2.1.10.7.21.4 Coordination Message - Send. The TCP input shall send a coordination message to a TCP based on aircraft flight information and an associated, adapted TCP.

3.2.1.10.7.21.5 Coordination Message - Response. A coordination message from the sending TCP shall provide the options to order coordination information and require the receiving TCP to acknowledge the coordination message.

3.2.1.10.7.21.6 Message Acknowledge. TCP input shall acknowledge a coordination message when required by the sending TCP or adaptation.

3.2.1.10.8 Control of TCW Information

3.2.1.10.8.1 Select ESL. TCP input shall select the ESL for the entering TCW and TDW.

3.2.1.10.8.2 System Data. TCP input shall select and inhibit the display of any information in the system data area individually or simultaneously.

3.2.1.10.8.3 Operator Sign-on/Sign-off. TCP input shall include a sign-on and sign-off entry to document each operator at a TCW and TDW.

3.2.1.10.8.4 Training Mode. TCP input shall enable and disable training mode for a specified TCW and TDW.

3.2.1.10.8.5 Aural Alarm Enable/Disable. TCP input shall enable or disable the entering TCW's and TDW's aural alarms.

3.2.1.10.8.6 Display Brightness. TCP input shall select from a minumum of 4 brightnesses for text and graphics on a TCW and TDW.

3.2.1.10.8.7 Brightness Control. TCP input shall select brightness intensity individually for the different types of text and graphics presented on a TCW and TDW.

3.2.1.10.8.8 Display Center. TCP input shall relocate the display center to any geographic point within the terminal area.

3.2.1.10.8.9 Character Size. TCP input shall select from a set of adaptable character sizes with a minimum of 5 different character sizes for text display.

3.2.1.10.8.10 Data Lists

3.2.1.10.8.10.1 Display of Lists. TCP input shall enable or disable the display of any data list.

3.2.1.10.8.10.2 Relocate. TCP input shall reposition data lists to any location on the TCW and TDW display.

3.2.1.10.8.10.3 Access To Data. When information is not displayed due to insufficient space in a list or view, a method of access to this information shall be available to the TCP.

3.2.1.10.8.11 Display Maps. TCP input shall activate and deactivate the simultaneous combination or individual display of any 10 different TCW and TDW digital maps.

3.2.1.10.8.12 Pointer Initial Position Activation. TCP input shall enable and disable the movement of the pointer device screen icon back to the initial pointer position after an entry on a TCW and TDW.

3.2.1.10.8.13 Pointer Initial Position Selection. TCP input shall select the initial position where the pointer device screen icon appears after an entry on a TCW and TDW.

3.2.1.10.8.14 Range Rings. TCP input shall select and inhibit the display of range rings on the entering TCW and TDW.

3.2.1.10.8.15 Range Ring Intervals. TCP input shall select range rings at a minimum of 2, 5, 10, and 20 nm intervals.

3.2.1.10.8.16 Range Ring Off-Center. TCP input shall center range rings to any location within the terminal area.

3.2.1.10.8.17 Display Range. TCP input shall select a display range from 6 nautical miles to the maximum coverage area without modifying the character size and line width.

3.2.1.10.8.18 Target Position History. TCP input shall enable, disable, and set the number of target position history notations up to at least 4 notations at the TCW and TDW.

3.2.1.10.8.19 Alarm Volume. TCP input shall adjust the volume for the entering TCW's and TDW's aural alarms.

3.2.1.10.8.20 Weather. TCP input shall select and inhibit a minimum of two of the available six weather levels for display.

3.2.1.10.8.21 Weather Mapping. TCP input shall map processed weather levels to displayed weather levels.

3.2.1.10.8.22 Display Presentation Mode. TCP input shall select the radar display presentation mode.

3.2.1.10.8.23 Sensor Selection. In single sensor display presentation mode, TCP input shall select the sensor information to be displayed at the entering TCW and TDW.

3.2.1.10.8.24 Leader Direction Control

3.2.1.10.8.24.1 Automatic Offset - Single Aircraft. TCP input shall enable or disable the automatic offset of overlapping data blocks for a specified aircraft on the entering TCW and TDW.

3.2.1.10.8.24.2 Automatic Offset - TCW. TCP input shall enable or disable the automatic offset of overlapping data blocks for the entering TCW and TDW.

3.2.1.10.8.24.3 Offset Data Block Type. TCP input shall offset the leader and data block of a selected data block type to a north, northwest, west, southwest, south, southeast, east, or northeast direction at the entering TCW and TDW.

3.2.1.10.8.24.4 Offset Single Data Block. TCP input shall offset the leader and data block of a single selected data block to a minimum of north, northwest, west, southwest, south, southeast, east, or northeast direction at the entering TCW and TDW.

3.2.1.10.8.24.5 Leader Length. TCP input shall permit the selection of the length for all leader lines at a TCW and TDW.

3.2.1.10.8.24.6 Manual Leader Entries. TCP manual leader direction entries shall override automatic leader direction changes until the aircraft situation meets other adapted criteria for automatic leader direction changes.

3.2.1.10.8.25 Preference Sets

3.2.1.10.8.25.1 Multiple Preference Sets. Each ATC operator shall establish and store multiple preference sets which control selectable display features.

3.2.1.10.8.25.2 Activate ATC Operator Preferences. An ATC operator preference set shall be activated via a specific TCP entry.

3.2.1.10.8.25.3 Adaptable Preferences. The adaptable preference set shall capture all display setting adjustments.

3.2.1.10.8.25.4 Modification Of Preference Sets. The TCP input shall modify preference settings as desired.

3.2.1.10.8.25.5 Save Current Display To A Preference Set. TCP input shall, when requested, save the settings of a current display to a preference set.

3.2.1.10.8.25.6 Default Preference Sets. Each TCP shall have one default preference set.

3.2.1.10.9 Control of System Wide Data

3.2.1.10.9.1 Position Acceptance of Entries. Both the MCP and the TCP shall accept and process all Control of System Wide Data entries.

3.2.1.10.9.2 Altimeter. TCP input shall modify the altimeter setting for a specified geographic region.

3.2.1.10.9.3 ATIS. TCP input shall modify the ATIS for specified TCP(s) and adapted terminal areas.

3.2.1.10.9.4 Interfacility Message Printout. TCP input shall enable and disable the printout of all interfacility messages or selected message types as specified by the TCP.

3.2.1.10.9.5 Automatic Handoff Processing - Entire System. TCP input shall enable and disable automatic handoff processing for the entire system.

3.2.1.10.9.6 IFDT - Entire System. TCP input shall enable and disable IFDT for a specified ARTCC with selectable options to:

a. delete flight plans of interfacility origin for the entire system.
b. change interfacility capability to flight data processing (FDP) interface mode.
c. enable/disable by ARTCC.
d. enable/disable by terminal area.

3.2.1.10.9.7 System Control of Safety Functions

3.2.1.10.9.7.1 CA Processing - Entire System. TCP input shall enable and disable CA processing for the entire system.

3.2.1.10.9.7.2 CASA Processing - Entire System. TCP input shall enable and disable CASA processing for the entire system.

3.2.1.10.9.7.3 CRDA Processing - Entire System. TCP input shall enable and disable CRDA processing for the entire system.

3.2.1.10.9.7.4 FMA Processing - Entire System. TCP input shall enable and disable FMA processing for the entire system.

3.2.1.10.9.7.5 MCI Processing - Entire System. TCP input shall enable and disable MCI processing for the entire system.

3.2.1.10.9.7.6 CA/MCI Processing - Adaptation. TCP input shall enable and disable adapted areas defined by altitude and geographic parameters from CA/MCI processing.

3.2.1.10.9.7.7 MSAW Processing - Entire System. TCP input shall enable and disable MSAW processing for the entire system.

3.2.1.10.9.7.8 MSAW Approach Monitor. TCP input shall enable and disable MSAW approach monitoring processing for the entire system.

3.2.1.10.9.8 Test Targets. TCP input shall enable and disable the display of radar and beacon test targets.

3.2.1.10.9.9 Performance Monitoring. TCP input shall enable and disable performance monitoring of one or more of the system components with option to select the interval of data collection and printing and the location of data display.

3.2.1.10.9.10 System Date. TCP input shall enter the system date and override the date data from the external time source input.

3.2.1.10.9.11 System Time. TCP input shall enter the system time and override the time data from the external time source input.

3.2.1.10.9.12 Reset System Date and Time. TCP input shall select the independent time source for the system date and time.

3.2.1.10.9.13 Data Recording. TCP input shall enable and disable data recording for the entire system.

3.2.1.10.9.14 Test Mode. TCP input shall enable and disable test mode for the entire system after receiving confirmation from the TCP.

3.2.1.10.10 Controller Position Configuration

3.2.1.10.10.1 Configuration Command Entries. Both the MCP and the TCP shall accept and process all Controller Position Configuration entries.

3.2.1.10.10.2 Multiple Positions

3.2.1.10.10.2.1 TCW. Each TCW shall support three unique TCPs.

3.2.1.10.10.2.2 TDW. Each TDW shall support two unique TCPs.

3.2.1.10.10.2.3 Data Display Devices. Each unique TCP shall have its own pointer and data input areas displayed on a TCW and TDW.

3.2.1.10.10.3 Consolidation of TCPs

3.2.1.10.10.3.1 Basic Consolidation. TCP input shall perform basic consolidation for two or more TCPs.

3.2.1.10.10.3.2 Full Consolidation. TCP input shall perform full consolidation for two or more TCPs.

3.2.1.10.10.3.3 Limited Consolidation. TCP input shall perform limited consolidation for two or more TCPs.

3.2.1.10.10.3.4 Consolidate All. TCP input shall perform consolidation for all TCPs with the option to include or exclude tower TCPs.

3.2.1.10.10.3.5 Deconsolidation. TCP input shall perform deconsolidation for two or more TCPs.

3.2.1.10.10.3.6 Consolidation Printout. TCP input shall activate a printout of the TCP configuration detailing all TCP consolidations.

3.2.1.10.10.4 Additional Input Devices Associated With TCPs

3.2.1.10.10.4.1 Coupling. TCP input shall permit the input device set allocated to a TCP to be coupled with other TCP(s) resulting in an additional input device set associated with the specified TCP.

3.2.1.10.10.4.2 De-Coupling. TCP input shall de-couple the input device(s) of the specified TCP.

3.2.1.10.10.5 Sectorization

3.2.1.10.10.5.1 Resectorization. TCP input shall select a configuration plan and activate resectorization with the option of including or excluding tower TCPs.

3.2.1.10.10.5.2 Partial Resectorization. TCP input shall activate partial resectorization for specified fixes and specified TCPs.

3.2.1.10.10.5.3 Sectorization Printout. TCP input shall activate a printout of the TCP configuration detailing all TCP associations to entry and exit fixes from a TCW and TDW.

3.2.1.10.10.6 Training Mode - TCW. TCP input shall place any TCW and TDW into training mode.

3.2.1.11 Air Traffic Control Operational Data Display

3.2.1.11.1 Controller Position Display Presentation. All display presentation functions shall be available at all TCPs.

3.2.1.11.2 Data Block Transformations

3.2.1.11.2.1 Airspace Regions. The data block shall indicate when an aircraft enters an adapted three dimensional region and data field values match values specified in adaptation.

3.2.1.11.2.2 Filters. The data block shall uniquely indicate when aircraft are within active filter bounds.

3.2.1.11.2.3 Ident. The data block shall uniquely indicate when the special position indicator bit of the beacon target report identifies an aircraft ident setting.

3.2.1.11.2.4 Beacon Mismatch. The data block shall uniquely indicate when there is a mismatch between the assigned and reported beacon code and indicate the assigned beacon code.

3.2.1.11.2.5 Track - Blind Area. The data block shall uniquely indicate when a track is not receiving surveillance updates and remain at the last reported position when in an adaptable radar/beacon blind area.

3.2.1.11.2.6 Departure Message Error. The data block shall uniquely indicate when a departure message transmission failure occurs, an acknowledgement to a transmitted departure message is not received or manual association on a TCP entered flight plan occurs to indicate the need for manual coordination.

3.2.1.11.2.7 Transponder Indicators. The data block shall uniquely indicate when an aircraft transponder is indicating the following conditions:

a. emergency
b. hijack
c. radio failure
d. suspect aircraft

3.2.1.11.2.8 Transponder Aural Alarm. The TCW and TDW aural alarm shall sound when viewing data from a sensor that is reporting adapted transponder indicators.

3.2.1.11.2.9 Adapted Values. Geographic or data field values that correspond to adapted values shall force the display of other data fields in data blocks.

3.2.1.11.2.10 Automatic Data Block Force. Geographic or data field values that correspond to adapted values shall force the display of an adapted data block type to adapted TCP(s).

3.2.1.11.2.11 Departure Acquisition Failure. The data block shall uniquely indicate when a departing aircraft fails to automatically acquire in an adaptable departure area.

3.2.1.11.2.12 Handoff

3.2.1.11.2.12.1 Auto Handoff Display. The indication of auto handoff shall be inhibited when track position and data field values match adaptation set parameters.

3.2.1.11.2.12.2 Distance Criteria. The data block shall uniquely indicate when an interfacility handoff is received on a tracked target that does not satisfy an adapted distance criteria.

3.2.1.11.2.12.3 Handoff Notification. The data block shall uniquely indicate to TCP(s) aircraft that are in handoff along with the sending/receiving TCP symbols.

3.2.1.11.2.12.4 Handoff - Receiver. When a handoff is initiated, the sending TCP aircraft data block shall display the receiving TCP symbol for an adapted time.

3.2.1.11.2.12.5 Handoff - Sender. When a handoff is initiated, the receiving TCP aircraft data block shall display the sending TCP symbol for an adapted time.

3.2.1.11.2.12.6 Handoff Missing Track Update (TU). When an aircraft is being handed off to a STARS position from an external position and a track update interfacility message for that aircraft is not received, an indication shall be presented to the TCP.

3.2.1.11.2.13 Unreasonable Mode C. The data block shall uniquely indicate when an unreasonable Mode C altitude is received for an aircraft.

3.2.1.11.2.14 Negative Altitude. The data block shall uniquely indicate when the aircraft's Mode C altitude is transmitting a negative altitude.

3.2.1.11.2.15 Out of Sensor Coverage. The data block shall uniquely indicate when an aircraft leaves the adapted sensor coverage area, but is still under the control of a TCP.

3.2.1.11.2.16 Pointout. The TCW and TDW shall pointout an aircraft by displaying an adapted data block type at the TCW(s) of the specified pointout receiver TCP(s).

3.2.1.11.2.17 Update Position from Interfacility Data. The data block shall uniquely indicate when an aircraft's position is being updated from interfacility message data.

3.2.1.11.2.18 Search Only. The data block shall uniquely indicate when an aircraft is only supported by search radar returns.

3.2.1.11.2.19 Scratch Pad Display. The scratch pad data field of a data block shall provide predefined information to the TCP when flight status including arrival, departure, overflight, and VFR; fix information; and geographic area information is within adapted values.

3.2.1.11.2.20 Hold-Last Reported Position. The data block shall remain in the last reported beacon position when an aircraft in hold has not received a beacon report update for an adapted time.

3.2.1.11.2.21 Track Non-Correlation. The data block shall uniquely indicate when a track has not correlated based upon adapted parameters.

3.2.1.11.2.22 Track Non-Updating. The data block shall remain in the last reported position when an aircraft is inhibited from updating.

3.2.1.11.3 Data Fields

3.2.1.11.3.1 Data Fields - General. Data fields shall form data block types and data lists as defined in adaptation.

3.2.1.11.3.2 Aircraft Equipment. A data field shall define aircraft equipment.

3.2.1.11.3.3 Aircraft Type. A data field shall define aircraft type.

3.2.1.11.3.4 Aircraft Identification. A data field shall define ACID.

3.2.1.11.3.5 Airport Identifier. A data field shall define airport identifier.

3.2.1.11.3.6 Arrival Time. A data field shall define arrival time.

3.2.1.11.3.7 Controller Assigned Altitude. A data field shall uniquely define controller assigned altitude.

3.2.1.11.3.8 Assigned Beacon Code. A data field shall define assigned beacon code.

3.2.1.11.3.9 Controller Entered Reported Altitude. A data field shall uniquely define controller entered pilot reported altitude.

3.2.1.11.3.10 Departure Time. A data field shall define departure time.

3.2.1.11.3.11 Transponder Indicators. A data field shall define twelve transponder indicators which are based upon a corresponding set of adapted aircraft beacon codes.

3.2.1.11.3.12 TCP Indicator. A data field shall define a unique TCP indicator.

3.2.1.11.3.13 Entry Fix. A data field shall define aircraft entry fix.

3.2.1.11.3.14 Exit Fix. A data field shall define aircraft exit fix.

3.2.1.11.3.15 Flight Status. A data field shall define aircraft flight status including any logical combination of arrival, departure, overflight, VFR, IFR, and VFR-on-Top status.

3.2.1.11.3.16 Ground Speed. A data field shall define aircraft ground speed.

3.2.1.11.3.17 Handoff Positions. A data field shall define the facility and position symbol of the handoff sender and receiver as applicable.

3.2.1.11.3.18 Information Transfer. A data field shall define an information transfer indicator.

3.2.1.11.3.19 Data List Line Identifier. A data field shall define a data list line identifier.

3.2.1.11.3.20 Mode C Altitude. A data field shall define Mode C altitude corrected for barometric pressure below an adapted flight level.

3.2.1.11.3.21 Number of Aircraft in Formation. A data field shall define the number of aircraft in a formation.

3.2.1.11.3.22 Pointout Indicator. A data field shall define an aircraft pointout indicator.

3.2.1.11.3.23 Pointout Initiator. A data field shall define the initiating TCP of an aircraft pointout.

3.2.1.11.3.24 Reported Beacon Code. A data field shall define reported beacon code.

3.2.1.11.3.25 Requested Altitude. A data field shall uniquely define requested altitude from flight plan information.

3.2.1.11.3.26 Safety Alerts. Data fields shall define all safety alerts.

3.2.1.11.3.27 Safety Inhibits. Data fields shall define all safety alert inhibit indicators.

3.2.1.11.3.28 Scratch Pad. A data field shall define system or controller entered scratch pad data of at least seven alphanumeric characters.

3.2.1.11.3.29 Special Designators. A data field shall define adaptable special designators to include a B757 and heavy jet at a minimum.

3.2.1.11.3.30 Special Equipment Indicator. A data field shall define adaptable special equipment indicators to include TCAS, GPS, and Datalink at a minimum.

3.2.1.11.3.31 Special Position Indicator. A data field shall define a special position ident using a minimum of two characters.

3.2.1.11.3.32 Track Update Status. A data field shall define an indication of when a track is not being updated with surveillance data.

3.2.1.11.3.33 Mode 2 Indication. A data field shall define a Mode 2 reporting aircraft.

3.2.1.11.3.34 Hold. A data field shall define an aircraft in hold.

3.2.1.11.4 Display of Target Data

3.2.1.11.4.1 Radar Coordinates. All target and map data shall be displayed in radar coordinates.

3.2.1.11.4.2 Adaptable Data Block

3.2.1.11.4.2.1 Data Block Types. The capability shall exist to define a minimum of fourteen (14) data block types that include any combination of the specified minimum data fields in Section 3.2.1.11.3, Data Fields, based on adaptation settings.

3.2.1.11.4.2.2 Data Block Size

3.2.1.11.4.2.2.1 Data Block Size-Minimum Definition. The data block sizing shall permit an adaptable definition of data elements to include at a minimum five(5) lines for a data block with 20 characters of data per line including blanks.

3.2.1.11.4.2.2.2 Data Block Size-Adaptable Parameters. The number of lines and characters per line for each type of data block shall be uniquely defined in adaptation.

3.2.1.11.4.2.3 Timeshare of Data Fields. All data fields in a data block shall have the capability to share the same area of a data block by alternating the display of 2 or 3 data fields in the data block as defined by adaptation.

3.2.1.11.4.2.4 Priority of Data Fields. Data fields that occupy the same position in a data block shall allow adaptable priorities to be assigned to control the display of the data fields.

3.2.1.11.4.2.5 Leader Line. The leader line positioning shall be adaptable to point from the displayed target to any line of the data block as defined by adaptation.

3.2.1.11.4.2.6 Leader Line - Consolidation. Data block leader line direction of tracks being transferred in a full consolidation shall be maintained on the display of the TCP receiving the consolidated tracks until the receiving TCP explicitly modifies the direction.

3.2.1.11.4.2.7 Adaptable Leader Direction. Initial data block leader line direction shall be based upon geographic information, data block type, flight plan status, and any data block data field values as defined in adaptation.

3.2.1.11.4.3 Display Presentation Modes

3.2.1.11.4.3.1 Multiple Sensor Display. The TCW and TDW shall display air traffic data from integrated multiple radar sensors as a single display presentation.

3.2.1.11.4.3.2 Single Sensor Ground Position. The TCW and TDW shall display air traffic data in single sensor ground position display mode.

3.2.1.11.4.3.3 Single Sensor Slant Position. The TCW and TDW shall display air traffic data in single sensor slant position display mode.

3.2.1.11.4.4 Digital Map Display. The TCW and TDW shall display a minumum of 10 digital maps simultaneously or individually.

3.2.1.11.4.5 Weather

3.2.1.11.4.5.1 Displayed Levels. The TCW and TDW shall display at least two distinguishable levels of processed weather mapped from the six available.

3.2.1.11.4.5.2 Targets in Weather. Aircraft targets shall be visible through any of the selected levels of displayed weather data.

3.2.1.11.4.6 Quicklook Display. The TCW and TDW shall display data blocks as presented at the selected TCP.

3.2.1.11.4.7 Range Rings. The TCW and TDW shall display symmetric circular range rings at a minimum of 2, 5, 10, and 20 nm intervals centered on any point.

3.2.1.11.4.8 Altitude Restriction Display. The TCW and TDW shall display the name of a selected area and the associated altitude restrictions at a TCP defined location on the display.

3.2.1.11.4.9 Geographic Restriction Display. The TCW and TDW shall display geographic restrictions to the TCP by indicating a specified area along with a TCP entered special activity title and the altitude restriction.

3.2.1.11.4.10 Display of Controller Aids

3.2.1.11.4.10.1 CA/MCI

3.2.1.11.4.10.1.1 CA/MCI Visual Alerts. When CA/MCI is enabled, the TCW and TDW shall visually indicate safety alerts to any TCP viewing adapted data block types for aircraft in conflict.

3.2.1.11.4.10.1.2 CA/MCI Aural. When CA/MCI is enabled, the TCW and TDW shall aurally indicate safety alerts to any TCP controlling aircraft in conflict.

3.2.1.11.4.10.2 MSAW

3.2.1.11.4.10.2.1 MSAW Visual. When MSAW is enabled, the TCW and TDW shall visually indicate safety alerts to any TCP viewing adapted data blocks.

3.2.1.11.4.10.2.2 MSAW Aural. When MSAW is enabled, the TCW and TDW shall aurally indicate safety alerts to any TCP viewing adapted data blocks.

3.2.1.11.4.10.3 CRDA. When CRDA is enabled, the TCW and TDW shall present CRDA special aircraft symbology including target and image reference lines and target and image reference points in their appropriate location as defined in adaptation.

3.2.1.11.4.10.4 CASA. When CASA is enabled, the TCW and TDW shall present CASA special aircraft symbology including target and image reference lines and target and image reference points in their appropriate location as defined in adaptation.

3.2.1.11.4.10.5 FMA. When FMA is enabled, the TCW and TDW shall visually and aurally indicate alert messages with the colors and FMA symbols defined in adaptation.

3.2.1.11.4.10.6 Emergency Information. The emergency information shall display the airport identifier, length of runway, distance to the closest airport capable of handling the selected aircraft, 5 significant characters of the Unicom frequency, vector heading to the airport, and lighted/unlighted airport status.

3.2.1.11.4.10.7 Hospital Information. Hospital information shall display the hospital identifier, helipad equipped, lighted/unlighted status, and vector heading to the hospital.

3.2.1.11.4.11 Target Position

3.2.1.11.4.11.1 Overlapping Coverage. When target reports from single or multiple sensors are received, the TCW and TDW shall display a single position symbol and data block and support flight data for an aircraft.

3.2.1.11.4.11.2 Reported Target Position. The TCW and TDW shall display target position based on reported surveillance data.

3.2.1.11.4.11.3 Tracked Position. The TCW and TDW shall display the tracked position of a target when the track has not correlated.

3.2.1.11.4.11.4 Target Position History. The TCW and TDW shall display the target position history(ies) of any target(s).

3.2.1.11.4.11.5 Target Symbology

3.2.1.11.4.11.5.1 Associated Targets. The TCW and TDW shall display the TCP symbol at the target reported position when the flight plan has been associated with a data block.

3.2.1.11.4.11.5.2 Unassociated Target Symbol. The TCW and TDW shall display a unique unassociated target symbol for Mode C selected code, Mode C non-selected code, Non-Mode C selected code, Non-Mode C non-selected code, and search only targets.

3.2.1.11.4.11.5.3 TCP Symbol. The TCW and TDW shall display the TCP symbol for targets that are controlled by another TCP.

3.2.1.11.4.11.5.4 Parrot Display. The TCW and TDW shall uniquely display the position of parrots.

3.2.1.11.4.11.5.5 Permanent Echo. The TCW and TDW shall uniquely display the position of permanent echoes.

3.2.1.11.4.11.5.6 Test Targets. The TCW and TDW shall display unique identifiers for search and beacon test targets at the reported position.

3.2.1.11.4.11.6 Target Extent Symbol. The target extent symbol shall indicate the target size scaled proportional to the resolution of the radar and shall display centered on the reported target position in single sensor slant range only and tangential to the radar origin.

3.2.1.11.4.11.7 Range and Heading. The TCW and TDW shall display range and heading information from a selected aircraft to a specified fix or airport.

3.2.1.11.5 Display of List and Tabular Data

3.2.1.11.5.1 Display Coordinates. All list and tabular data shall be displayed in display coordinates.

3.2.1.11.5.2 Select/Inhibit. Any list or tabular data can be individually selected or inhibited for display by a TCP.

3.2.1.11.5.3 Compass Rose. The TCW and TDW shall display a compass rose oriented to the direction of magnetic or true north, as adapted for the selected sensor, and providing directions at 10 degree increments.

3.2.1.11.5.4 Duplicate ACID. The TCW and TDW shall uniquely indicate when a TCP is viewing or performing entries on an aircraft with a duplicate ACID.

3.2.1.11.5.5 Duplicate Beacon Code. The TCW and TDW shall uniquely indicate when a TCP is viewing or performing entries on an aircraft with a duplicate beacon code.

3.2.1.11.5.6 Display Presentation Mode. The TCW and TDW shall display an indication of the radar presentation mode.

3.2.1.11.5.7 Data Lists

3.2.1.11.5.7.1 Adaptable. The TCW and TDW shall display any of sixteen adaptable data lists each of which includes sets of any combination of data fields specified in adaptation.

3.2.1.11.5.7.2 Data Lists - Inclusion/Exclusion. Values of data fields that correspond to adaptation values shall control the inclusion and exclusion of data in specified data lists.

3.2.1.11.5.7.3 Data List Field Order. Adaptation shall define the ordering of data list sets by any field in the data list.

3.2.1.11.5.8 Preview Area

3.2.1.11.5.8.1 Data Entry Contents. A preview area on the TCW and TDW for each input device shall display the content of an input data entry prior to submission of the entry.

3.2.1.11.5.8.2 Editing Prior to Entry. TCP input shall have the capability to edit data that is displayed in the preview area prior to submission of the entry to the TCW and TDW for processing.

3.2.1.11.5.8.3 Editing Erroneous Entry. When an entry error occurs, the TCW and TDW shall display the error in the preview area, indicate the portion of the entry that is in error, and allow the entry to be edited and resubmitted.

3.2.1.11.5.9 Error Message Area. An area on the TCW and TDW for each input device shall display error messages presented in response to input data entries.

3.2.1.11.5.10 Readout Area. An area on the TCW and TDW for each input device shall display messages presented in response to input data entries.

3.2.1.11.5.11 Display Preference Information. An area on the TCW and TDW shall display TCP preference setting information for each TCP.

3.2.1.11.5.12 System Data

3.2.1.11.5.12.1 Display. System data shall be displayed at the TCW and TDW.

3.2.1.11.5.12.2 Future Definition. The system data shall be expandable to accommodate ten additional data items reserved for future definition.

3.2.1.11.5.12.3 Relocation. The system data shall be displayed at any selected location on the TCW and TDW.

3.2.1.11.5.12.4 Select - Inhibit System Data. Any element of system data shall be individually selected or inhibited for display by a TCP.

3.2.1.11.5.12.5 Status

3.2.1.11.5.12.5.1 System Status. The system data shall display the status of system wide ATC operational functions, current service level, and available service levels.

3.2.1.11.5.12.5.2 TCW Status. The system data shall display the status of operational functions that have been selected and inhibited at the TCW and TDW level.

3.2.1.11.5.12.5.3 TCP Status. The system data shall display the status of operational functions that have been selected and inhibited at the TCP level.

3.2.1.11.5.12.6 Unique General Information. The system data shall display unique general information.

3.2.1.11.5.12.7 Quicklook. The system data shall indicate any TCPs that are quicklooked.

3.2.1.11.5.12.8 Radar Source Identification. In single sensor presentation mode, the system data at each TCW and TDW shall indicate the source of the radar sensor information for that TCW and TDW.

3.2.1.11.5.12.9 Data Recording. The system data shall indicate to the TCW and TDW when data recording is enabled and disabled.

3.2.1.11.5.12.10 Sectorization Indicator. The system data shall display the currently selected system sectorization configuration.

3.2.1.11.5.12.11 Date. The system data shall display the system date.

3.2.1.11.5.12.12 Time. The system data shall display the system time.

3.2.1.11.5.12.13 Altimeter. The system data shall display adaptable altimeter settings based on geographic region.

3.2.1.11.5.12.14 Alert Inhibits. The system data shall display safety alert inhibits.

3.2.1.11.5.12.15 ATIS. The system data shall display ATIS data.

3.2.1.11.5.12.16 Consolidation Status. The system data shall display the TCP consolidation status.

3.2.1.11.5.12.17 System Errors. The system data shall display system errors that affect operational capabilities at the TCW and TDW.

3.2.1.11.5.12.18 Beacon Filter. The system data shall display selected beacon filter codes.

3.2.1.11.5.12.19 Altitude Filter. The system data shall display altitude filter limits.

3.2.1.11.5.12.20 Transponder Indicators. The system data shall display transponder indicators.

3.2.1.11.5.12.21 Interfacility Status. The system data shall display an indication when interfacility communications experiences a failure.

3.2.1.11.5.12.22 Test Targets. The system data shall uniquely indicate that search and beacon test targets are being received and displayed.

3.2.1.11.5.13 Display of Coordination Information

3.2.1.11.5.13.1 Coordination Messages. The TCW and TDW shall display coordination messages as ordered coordination information with a notation to indicate when a message acknowledgment is required.

3.2.1.11.5.13.2 Information Grouping. TCWs and TDWs shall be adapted to display coordination information grouped per airport.

3.2.1.11.5.13.3 Information Ordering. The TCW and TDW shall display coordination information as ordered in the coordination message.

3.2.1.11.5.13.4 Information Display. The TCWs and TDWs of adapted TCPs sending and receiving coordination messages shall display coordination information.

3.2.1.11.5.13.5 Unsent Coordination Data. The TCW and TDW shall display a notation to indicate coordination data that has not been sent to the associated, adapted TCP.

3.2.2 System Operational Functions

3.2.2.1 System Status Monitoring

3.2.2.1.1 General Monitoring Requirements

3.2.2.1.1.1 Monitor FSL Resources. The status of all resources configured for the FSL operations shall be continually monitored.

3.2.2.1.1.2 Monitor ESL Resources. The status of all resources configured for ESL operations shall be continually monitored.

3.2.2.1.1.3 Automatic Status Data Acquisition. Resource status data acquisition shall be performed automatically.

3.2.2.1.1.4 Automatic Failure Detection. Failure of any resource shall be detected automatically.

3.2.2.1.1.5 MCP Failure Detection. When possible, a visual indication of any MCP failure shall be displayed on the associated workstation.

3.2.2.1.1.6 MCP Failure Tolerance. MCP failures shall be transparent to all TCPs.

3.2.2.1.2 Configuration Monitoring

3.2.2.1.2.1 Hardware Component Status. The status of each hardware component shall be monitored.

3.2.2.1.2.2 Software Component Status. The status of each software component shall be monitored.

3.2.2.1.2.3 FSL Configuration Display. A graphic view of the FSL configuration shall be displayed.

3.2.2.1.2.4 ESL Configuration Display. A graphic view of the ESL configuration shall be displayed.

3.2.2.1.2.5 Function/Selection Display. The list of the selectable functions and the associated enable/disable selection shall be displayed.

3.2.2.1.2.6 Current Time Display. The system time obtained from the independent time source (ITS) shall be displayed at all times on all local and remote MCW displays.

3.2.2.1.3 External System Interface Monitoring

3.2.2.1.3.1 External Interface Status. The status of each external system interface shall be monitored.

3.2.2.1.3.2 External Interface Failure. Failure to receive data from an external system interface for an adaptable time interval shall be used as a criteria for detecting failure of an external system interface.

3.2.2.1.3.3 External Interface Error Rate. An error rate shall be calculated for each external system interface.

3.2.2.1.3.4 External Interface Error Detection. The external system interface error rate shall be compared with an adaptable threshold to detect an external interface failure.

3.2.2.1.3.5 External Interface Status Display. The status of each external system interface shall be displayed.

3.2.2.1.4 Radar Status Monitoring

3.2.2.1.4.1 Radar Error Rate. Errors reported by each radar shall be used to calculate the error rate for that radar.

3.2.2.1.4.2 Radar Error Detection. The radar error rate for each radar shall be compared with an adaptable threshold to detect a radar failure.

3.2.2.1.4.3 Radar Error Rate Display. Radar error rate for each radar shall be displayed.

3.2.2.1.4.4 Correction Factors Display. Current and calculated collimation and registration correction factors shall be displayed.

3.2.2.1.4.5 Correction Factors Indication. The display of correction factors shall indicate the values which have exceeded adaptable thresholds.

3.2.2.1.4.6 Radar Maintenance View. Target reports from a single selected radar shall be displayed.

3.2.2.1.4.7 Permanent Echo/Parrot Display. The location of each permanent echo/parrot on the radar maintenance view shall be displayed using unique adaptable symbols.

3.2.2.1.4.8 RTQC Message Display. RTQC messages from surveillance systems shall be displayed.

3.2.2.1.4.9 Status and Radar Identification Message Display. Status messages and Radar Identification messages from surveillance systems shall be displayed.

3.2.2.1.5 Event Notification

3.2.2.1.5.1 Alarm Condition Notification. A notification shall be generated when an alarm condition is detected.

3.2.2.1.5.2 Alert Condition Notification. A notification shall be generated when an alert condition is detected.

3.2.2.1.5.3 Return-to-Normal Condition Notification. A notification shall be generated when a return-to-normal condition is detected.

3.2.2.1.5.4 Error Condition Notification. A notification shall be generated when an error condition is detected.

3.2.2.1.5.5 Resource State Change Notification. A notification shall be generated when the state of a resource changes.

3.2.2.1.5.6 Function Selection Notification. A notification shall be generated when a selectable function is enabled or disabled.

3.2.2.1.5.7 Notification Filtering. Redundant or duplicate notifications shall be filtered out.

3.2.2.1.5.8 Notification Contents. Notification data shall include the associated resource identification, date, and timestamp.

3.2.2.1.5.9 Notification Display. All notifications shall be displayed.

3.2.2.1.5.10 Notification Retrieval. All notifications shall be available for display for a period of 24 hours.

3.2.2.2 System Performance Monitoring

3.2.2.2.1 Collection of Performance Data

3.2.2.2.1.1 Computer Hardware Resource Utilization Monitoring

3.2.2.2.1.1.1 Computer Hardware Resource Data Sampling Interval Adaptation. The computer hardware resource data sampling interval used for performance data collection shall be adaptable or selectable.

3.2.2.2.1.1.2 Processor Utilization. The peak percentage of processor capacity in use during the computer hardware resource data sampling interval shall be determined for each task or process executing on each processor.

3.2.2.2.1.1.3 Memory Utilization. The peak percentage of memory capacity in use during the computer hardware resource data sampling interval shall be determined for each task or process executing on each processor.

3.2.2.2.1.1.4 Network Utilization. When a network is used, the peak percentage of network capacity in use during the computer hardware resource data sampling interval shall be determined.

3.2.2.2.1.1.5 Monitor Depletion of Computer Hardware Capacity. Percentages of computer hardware capacity shall be compared against adaptable thresholds to determine an alarm or alert condition.

3.2.2.2.1.2 System Workload Monitoring

3.2.2.2.1.2.1 System Workload Data Sampling Interval Adaptation. The system workload data sampling interval used for performance data collection shall be adaptable.

3.2.2.2.1.2.2 Track Storage Counts

3.2.2.2.1.2.2.1 Associated Track Count. The maximum number of associated tracks at any one point during the system workload data sampling interval shall be determined.

3.2.2.2.1.2.2.2 Unassociated Track Count. The maximum number of unassociated tracks at any one point during the system workload data sampling interval shall be determined.

3.2.2.2.1.2.2.3 Remaining Track Capacity. The minimum percent of remaining track capacity shall be determined in each system workload data sampling interval.

3.2.2.2.1.2.3 Flight Plan Counts

3.2.2.2.1.2.3.1 Maximum Flight Plan Count. The maximum number of flight plans at any one point during the system workload data sampling interval shall be determined.

3.2.2.2.1.2.3.2 Remaining Flight Plan Capacity. The minimum percent of remaining capacity shall be determined in each system workload data sampling interval.

3.2.2.2.1.2.4 Target Report Counts

3.2.2.2.1.2.4.1 Search Radar Target Reports Count. The peak and average count per scan shall be determined from primary radar only target reports during the system workload data sampling interval.

3.2.2.2.1.2.4.2 Beacon Target Reports Count. The peak and average count per scan shall be determined from beacon only target reports during the system workload data sampling interval.

3.2.2.2.1.2.4.3 Beacon-Reinforced Radar Target Reports Count. The peak and average count per scan shall be determined from beacon-reinforced radar target reports during the system workload data sampling interval.

3.2.2.2.1.2.5 Monitor Depletion of System Workload Capacity. Percentages of remaining system workload capacity shall be compared against adaptable thresholds to determine an alarm or alert condition.

3.2.2.2.1.3 Traffic Statistics

3.2.2.2.1.3.1 Traffic Data Sampling Interval Adaptation. The traffic data sampling interval used for performance data collection shall be adaptable or selectable.

3.2.2.2.1.3.2 Airport Operations Counts. The total number of aircraft for each category of operations and class of aircraft, in conformance with FAA Order 7210.3, paragraphs 14-20 through 14-26, shall be determined for each traffic data sampling interval.

3.2.2.2.1.3.3 Instrument Operations. The total number of aircraft for each instrument operation category/class of aircraft, in conformance with FAA Order 7210.3, paragraph 14-30 through 14-36 and 14-50 through 14-54, shall be determined for each traffic data sampling interval.

3.2.2.2.1.3.4 Adaptable Counts. The categories/classes used in traffic operations counts shall be adaptable.

3.2.2.2.2 Performance Data Statistics

3.2.2.2.2.1 Performance Data Summarization. The maximum, minimum, and average value of each data item specified in Section 3.2.2.2.1, Collection Of Performance Data, shall be computed over an adaptable summarization interval when a summarization interval is not specified by an operator.

3.2.2.2.2.2 Interval Annotation. Operator annotations for the summarization interval shall be accepted.

3.2.2.2.2.3 Display. A summary of performance data shall be displayed.

3.2.2.2.2.4 Upload. A summary of performance data shall be transmitted to the STARS remote support subsystem located at the OCC.

3.2.2.3 System Control

3.2.2.3.1 General Control Requirements

3.2.2.3.1.1 Initiate MCP Functionality. Input at a local or remote TCW or MCW shall intiate complete MCP functionality on that workstation.

3.2.2.3.1.2 System Control Authority. When more that one MCP is active, only one MCP shall have the authority to control system resources.

3.2.2.3.1.3 Switch Control Authority. MCP input shall switch control authority between MCPs.

3.2.2.3.1.4 Manage Full Service Resources. All resources configured for FSL operations shall be controlled by the MCP.

3.2.2.3.1.5 Manage Emergency Service Resources. All resources configured for ESL operations shall be controlled by the MCP.

3.2.2.3.1.6 Control Software and Data Transfer. Transfer of software components, software baselines and data over external interfaces shall be controlled by MCP input.

3.2.2.3.1.7 Initiate Diagnostic Tests. MCP input shall initiate diagnostic tests on a selected hardware component.

3.2.2.3.2 System Configuration Control

3.2.2.3.2.1 Software Release Level Control. Allocation of specific software components or baselines for operational use shall be controlled by MCP input.

3.2.2.3.2.2 FSL Coldstart Control. A single MCP input shall initiate a coldstart of all FSL resources.

3.2.2.3.2.3 ESL Coldstart Control. A single MCP input shall initiate a coldstart of all ESL resources..

3.2.2.3.2.4 Resource Coldstart Control. MCP input shall initiate a coldstart of selected resources.

3.2.2.3.2.5 FSL Warmstart Control. A single MCP input shall initiate a warmstart of all FSL resources.

3.2.2.3.2.6 ESL Warmstart Control. A single MCP input shall initiate a warmstart of all ESL resources.

3.2.2.3.2.7 Resource Warmstart Control. MCP input shall initiate a warmstart of selected resources.

3.2.2.3.2.8 Control Automatic Recovery. MCP input shall enable and disable automatic recovery.

3.2.2.3.2.9 Resource Reconfiguration Control. MCP input shall configure any individual resource into the selected resource state.

3.2.2.3.2.10 Partition Control. MCP input shall partition the STARS automation subsystem resources.

3.2.2.3.2.11 Software Initiation. MCP input shall initiate separate instances of the STARS automation subsystem software in different partitions.

3.2.2.3.2.12 Cut-Over. MCP input shall initiate cut-over between instances of STARS automation subsystem software executing in different partitions.

3.2.2.3.3 External System Interface Control

3.2.2.3.3.1 Interface State Transition. MCP input shall select automatic or manual transition from the off-line to the on-line state for any selected external system interface.

3.2.2.3.3.2 Interface Data Flow. MCP input shall enable and disable the flow of data from an external system.

3.2.2.3.3.3 Interface Diagnosis Test Initiation. MCP input shall initiate diagnostic tests on an interface in the off-line state.

3.2.2.3.3.4 Data Distribution In Off-Line State. Data from an interface in the off-line state undergoing diagnostic tests shall be available only at the MCP.

3.2.2.3.3.5 Data Distribution In On-Line State. Data from an interface in on-line state shall be distributed to air traffic functions and the Monitor and Control functions.

3.2.2.3.3.6 Radar Control

3.2.2.3.3.6.1 Correction Factors Automatic Calculation. The registration and collimation correction factors shall be calculated automatically when the criteria for the sample size is satisfied.

3.2.2.3.3.6.2 Correction Factors Calculation Initiation. MCP input shall initiate calculation of collimation and registration correction factors.

3.2.2.3.3.6.3 Generated Correction Factors Selection. MCP input shall select system-generated registration and collimation correction factors.

3.2.2.3.3.6.4 Manual Correction Factors Selection. MCP input shall select manually entered registration and collimation correction factors.

3.2.2.3.3.6.5 Correction Factors Discarding. MCP input shall discard selected collimation and registration correction factors.

3.2.2.3.3.6.6 Radar Site Selection. MCP input shall exclude radar sites from data collection and registration and collimation correction factor calculation.

3.2.2.3.3.6.7 Restart Radar Processing. MCP input shall restart the surveillance processing function with the option to apply or discard selected registration and collimation correction factors.

3.2.2.3.3.6.8 Ring Around Beacon Target Suppression. MCP input shall enable and disable the ringaround beacon target suppression by radar site, range and azimuth.

3.2.2.3.3.6.9 Reflected Beacon Target Suppression. MCP input shall enable and disable the reflected beacon target suppression by radar site, range, and azimuth.

3.2.2.4 Certification

3.2.2.4.1 Resource Verification

3.2.2.4.1.1 Off-line Resource Diagnostics. MCP input shall initiate comprehensive diagnostic tests on a resource in off-line state.

3.2.2.4.1.2 Periodic Background Verification

3.2.2.4.1.2.1 Hardware Component Verification. Periodic on-line tests shall be performed to verify that parameters of each hardware component are within adaptable operating ranges.

3.2.2.4.1.2.2 Operational Software Verification. Periodic on-line tests shall be performed to verify that corruption of operational software has not occurred since loading.

3.2.2.4.1.2.3 Software Release Verification. Periodic on-line tests shall be performed to verify that all software components in the configuration have consistent release levels for the operational and backup software.

3.2.2.4.1.3 Background Verification Frequency Control. The frequency of periodic background resource verification tests shall be MCP-selectable to any value within an adaptable range.

3.2.2.4.1.4 Resource Verification Initiation. MCP input shall initiate verification tests for a selected resource.

3.2.2.4.1.5 Display Of Verification Test Results. Results of each resource verification test shall be displayed.

3.2.2.4.1.6 Verification Test Failure Notification. An alarm notification shall be provided when a background resource verification test fails.

3.2.2.4.2 System Certification

3.2.2.4.2.1 System Certification Test Initiation. MCP input shall initiate system certification tests.

3.2.2.4.2.2 System Certification Tests. Verification tests for each resource shall be performed on-line when system certification tests are initiated.

3.2.2.4.2.3 System Certification Test Report Results. The system certification test report shall include a summary of results of all resource verification tests.

3.2.2.4.2.4 System Certification Test Report Content. The system certification test report shall indicate which resources passed, which resources failed, and which resources failed to respond.

3.2.2.4.2.5 System Certification Test Report Time Stamp. Results captured in the system certification test report shall be time and date stamped.

3.2.2.4.2.6 System Certification Test Report Display. Each system certification test report shall be displayed.

3.2.2.4.3 Service Certification

3.2.2.4.3.1 Service Certification Test Manual Initiation. MCP input shall initiate service certification tests at any time concurrent with the air traffic operations.

3.2.2.4.3.2 Service Certification Workstation. Service certification test output data shall be displayed on a TCW.

3.2.2.4.3.3 Simulated Radar and Flight Data. Service certification tests shall execute using simulated radar data and flight data inputs.

3.2.2.4.3.4 Service Certification Test Automatic Execution. After the manual initiation, service certification tests shall complete execution without additional MCP input.

3.2.2.4.3.5 Service Certification Test Report Results. The service certification test report shall include a summary of the results of the service certification tests.

3.2.2.4.3.6 Service Certification Test Report Deviation. The service certification test report shall indicate the deviations from the predefined expected results.

3.2.2.4.3.7 Service Certification Test Report Content. The service certification test report shall indicate which tests passed and which tests failed.

3.2.2.4.3.8 Service Certification Test Report Time Stamp. The report of service certification test results shall include a date and time stamp.

3.2.2.4.3.9 Service Certification Test Report Display. Each service certification test report shall be displayed.

3.2.2.5 Data Recording

3.2.2.5.1 Recording Mechanism

3.2.2.5.1.1 Continuous Recording. Once enabled, data recording shall be carried out on a continual basis.

3.2.2.5.1.2 Recording Medium. All data to be recorded shall be recorded on a single removable, non-volatile medium.

3.2.2.5.1.3 Twenty-Four Hour Recording. A minimum of twenty-four hours of system data shall be recorded on one or more elements of the same recording medium without operator intervention while the system operates under the workload and response times conditions defined in Section 3.2.4, System Performance.

3.2.2.5.1.4 Continuity During Changeover. Recording shall continue without loss of data when the primary recording device fails, when the primary recording element capacity is exhausted, or during a changeout of recording elements.

3.2.2.5.1.5 Time Stamping. Each data record shall have a date and time stamp.

3.2.2.5.1.6 Data Storage Duration. Data recording shall retain recorded data for no less than 15 days.

3.2.2.5.2 Data To Be Recorded

3.2.2.5.2.1 Target Report Data. All radar target report data shall be recorded.

3.2.2.5.2.2 Tracking Data. All unassociated and associated target tracking data, including altitude data shall be recorded.

3.2.2.5.2.3 Flight Plan Data. All flight plan data received and transmitted shall be recorded.

3.2.2.5.2.4 Interfacility Data. All interfacility messages shall be recorded.

3.2.2.5.2.5 External Interface Data. All external interface message traffic shall be recorded except the data content of messages received from the OSF or the SCSC.

3.2.2.5.2.6 Data Entry. All data entry device inputs, including pointer device location selections, shall be recorded.

3.2.2.5.2.7 Data Display. All data necessary to recreate any display shall be recorded.

3.2.2.5.2.8 Performance Data. All performance monitoring data shall be recorded.

3.2.2.5.2.9 Notification Data. Notification data shall be recorded.

3.2.2.5.2.10 Alarm/Alert Data. Monitored parameter values of data associated with alarm/alert conditions shall be recorded.

3.2.2.5.2.11 Error Data. Monitored parameter values of data associated with error conditions shall be recorded.

3.2.2.5.2.12 Configuration Data. The system configuration shall be recorded upon system initiation and upon each system configuration change.

3.2.2.5.2.13 Security Data. All security data items as specified in Section 3.2.2.8.5, Security Audit shall be recorded.

3.2.2.5.2.14 System Data. Site identity, software version, adaptation version, and record start/end time shall be recorded on each medium.

3.2.2.5.2.15 Verification Results Recording. The results of all background resource verification tests shall be recorded.

3.2.2.5.2.16 Certification Reports. All certification reports shall be recorded.

3.2.2.6 TCW Replay

3.2.2.6.1 TCW Reconstitution. Recorded FSL data shall be used to reconstitute a selected TCW display for a specified period of time, including alphanumeric data, target, weather and map symbology and indication of any TCP inputs, using the TCP configuration settings at the time of recording.

3.2.2.8.3.2.3 Assign User Functions To Operator Class. The functionality associated with each of nine operator classes shall be adaptable.

3.2.2.8.3.2.4 Multiple Operator Classes To Each Operator. One to nine operator classes shall be assigned to each operator.

3.2.2.8.3.3 External Systems

3.2.2.8.3.3.1 Data Validation. The system shall validate the source of all data upon entry into the STARS automation subsystem.

3.2.2.8.3.3.2 Packet Filtering. Packet filtering shall be performed for selectable external interfaces.

3.2.2.8.3.3.3 Packet Filtering Of Attributes. Packet validation shall be performed on the following attributes: packet source, packet destination, protocol type, protocol service, communication line/port, time of day, and day of week.

3.2.2.8.4 Security Integrity

3.2.2.8.4.1 Integrity Checks. The correct operation of system security elements shall be validated.

3.2.2.8.4.2 Integrity Anomalies. Operators shall be notified upon detection of integrity anomalies.

3.2.2.8.4.3 Message Integrity Checks For Security And Mission Critical Data. Message integrity checking shall be applied to verify security and mission critical objects.

3.2.2.8.5 Security Audit

3.2.2.8.5.1 Create And Maintain Audit Trail. An audit trail shall be created and maintained for all security audit events.

3.2.2.8.5.2 Traceability. An audit trail shall show traceability of an audited security event to the individual operator on the local system or any external connected system.

3.2.2.8.5.3 Protection. The security audit trail shall be protected from unauthorized modification, access, or destruction.

3.2.2.8.5.4 Security Audit Events. The following security relevant events shall be audited:

a. Operator identification and authentication attempts
b. External interface identification and authentication attempts
c. Access attempts to security and mission critical objects
d. External interprocess communications failures (including message format or type validation error, message integrity error, invalid message source/destination)
e. System administrator and security officer actions
f. Remote workstation connects and disconnections
g. Security integrity anomalies

3.2.2.8.5.5 Select Audit Events. The audit function shall provide for the selection of security audit events to be audited for each operator.

3.2.2.8.5.6 Minimum Security Audit Events. The following security relevant audit events shall always be audited:

a. Unsuccessful operator identification and authentication attempts
b. Unsuccessful external interface identification and authentication attempts
c. System administration and security officer actions
d. Security integrity anomalies

3.2.2.8.5.7 Audit Record Information. The information to be recorded with each security audit record shall be: operator ID, position or group, date/time, event type, security object, success/failure status.

3.2.2.8.5.8 Identification And Authentication Audit Records. The information to be recorded with each operator identification and authentication audit record shall be: operator ID, date/time, event type, security object, success/failure status, the origin of the request, and telephone caller ID, if available, for dial-up communication lines.

3.2.2.8.5.9 View Audit Information. The audit log shall be viewable at the MCP.

3.2.2.8.5.10 Produce On-Line Reports. Audit reports shall be produced on-line in both electronic media and printed reports.

3.2.2.8.5.11 Audit Report Reduction Filters. The audit report generation shall include reduction filters: date, time, user, operator class, workstation.

3.2.2.8.5.12 Security Alerts. An M&C operator shall be notified upon the occurance of an adaptable subset of security audit events.

3.2.2.8.6 Security Administration

3.2.2.8.6.1 Identification and Authentication. Security administration shall include the management of operator accounts that includes: creation of new operator accounts and deletion of operator accounts.

3.2.2.8.6.2 Audit

3.2.2.8.6.2.1 Audit Events. Security administration shall include the management for selecting security audit events to be audited for each operator.

3.2.2.8.6.2.2 Audit Reports. Security administration shall include the management for generation of security audit reports.

3.2.2.8.6.3 Integrity. Security administration shall include controlling integrity validation.

3.2.2.8.6.4 Access Control. Security administration shall control access between each security subject and each security object by the management of operator access controls and operator classes.

3.2.2.7.4.2 Service Certification Workstation. Service certification test output data for any selected STARS automation subsystem shall be displayed on a TCW located at the OCC.

3.2.2.7.5 NOCC System Interface. The OCC support subsystem shall transfer data over an external interface to the NOCC system in accordance with a government supplied ICD.

3.2.2.8 Security

3.2.2.8.1 General Security Requirements

3.2.2.8.1.1 FAA Order 1600.54B Controlled Access Protection. Controlled Access Protection shall be provided as defined in paragraph 805 of FAA Order 1600.54B, FAA Automated Information Systems Security Handbook.

3.2.2.8.1.2 FAA Order 1600.66 Information Protection. Information shall be protected against threats identified in FAA Order 1600.66 Appendix 2, Threats to Information.

3.2.2.8.1.3 Automation Subsystem Applicability. The security requirements shall apply to Full Service Level only.

3.2.2.8.1.4 Site Applicability. The security requirements shall apply to the Operational Support Facilities (OSF), Operations Control Centers (OCC), and the STARS Central Support Complex (SCSC) subsystems except for Security Integrity, Section 3.2.2.8.4.

3.2.2.8.2 Identification and Authentication

3.2.2.8.2.1 Local Operators

3.2.2.8.2.1.1 Availability of ATC Functions. ATC functions shall be available without identification and authentication by the operator.

3.2.2.8.2.1.2 Identification and Authentication Activation. The system shall provide the capability to activate the Identification and Authentication security service for ATC functions.

3.2.2.8.2.1.3 Identification and Authentication For Non-ATC Operators. Non-ATC functions shall be available after identification and authentication by the operator.

3.2.2.8.2.1.4 Authenticate Local Users. When the Identification and Authentication security service is active, the operator shall be identified and authenticated by a log-on operation.

3.2.2.8.2.1.5 Change Authentication Information. The system shall require operators to periodically change authentication information.

3.2.2.8.2.1.6 Passwords For Local Users. Authentication information (e.g., passwords) shall be modifiable by operators.

3.2.2.8.2.1.7 Authentication Upon Completion Of System Recovery. Previously authenticated operator(s) shall be automatically authenticated upon completion of recovery from a warmstart or workstation failure.

3.2.2.8.2.2 Remote Operators

3.2.2.8.2.2.1 Authenticate Remote Operators. Remote operators shall be authenticated by operator authentication information prior to performing desired functions.

3.2.2.8.2.2.2 Disconnect Remote Workstation. A remote workstation shall automatically be logically disconnected after an adaptable number of failed attempts to identify and authenticate.

3.2.2.8.2.2.3 Automatic Log-Off Remote Operator. A remote operator shall be automatically logged off after an adaptable period of non-activity. . . .

3.2.2.8.2.2.4 Remote Operator Recovery. Remote operators shall be required to authenticate upon completion of system recovery.

3.2.2.8.2.3 Authenticate External Computers. External computer systems which interface to the STARS automation subsystem shall identify and authenticate with the exception of the systems covered in the En Route Surveillance Radar/STARS ICD (NAS-IC-34130001), the Terminal Surveillance Radar/STARS IRD (NAS-IR-34032105), and the NAS Terminal En Route Interfacility ICD (NAS-IC-21058217).

3.2.2.8.3 Access Control

3.2.2.8.3.1 Operators

3.2.2.8.3.1.1 Control Access Between Subjects And Objects. Access shall be controlled between each security subject and each security object.

3.2.2.8.3.1.2 Maintenance Of Operator Functions. The system shall restrict maintenance of operator passwords and allowed functionality to an authorized operator.

3.2.2.8.3.1.3 Passwords For M&C Commands. Password access shall be required for an operator to execute system control commands.

3.2.2.8.3.2 Operator Classes

3.2.2.8.3.2.1 Purpose. The operator classes, with their allowed functionality, assigned to operators shall provide the capability of controlling access to functionality for each user.

3.2.2.8.3.2.2 Nine Operator Classes. A minimum of nine operator classes and the name of each shall be adaptable.

3.2.2.6.2 Replay Speed. The speed of TCW display replay shall be real time.

3.2.2.6.3 Select Replay Data. TCW data replay start time and stop time, and TCW identification shall be selectable at the MCP.

3.2.2.6.4 Initiate Replay. MCP input shall initiate replay for a specified replay period.

3.2.2.6.5 Freeze Replay. TCP input shall cause the replay to pause.

3.2.2.6.6 Reinitiate Replay. TCP input shall reinitiate replay at a point in time within the originally specified replay period.

3.2.2.7 OCC Support Subsystem

3.2.2.7.1 General Requirements

3.2.2.7.1.1 Status Data Collection. Status data from all monitored STARS automation subsystems shall be collected at an adaptable frequency by the OCC support subsystem.

3.2.2.7.1.2 Performance Data Collection. Performance data from all monitored STARS automation subsystems shall be collected at an adaptable frequency by the OCC support subsystem.

3.2.2.7.1.3 Data Entry Recording. All data entry device inputs to the OCC support subsystem, including pointer device location selections, shall be recorded.

3.2.2.7.1.4 Remote Monitoring Data Recording. All status and performance data collected from STARS automation subsystems shall be automatically recorded by the OCC support subsystem.

3.2.2.7.1.5 Recording Mechanism. All OCC support subsystem data recording shall be in accordance with Section 3.2.2.5.1, Recording Mechanism and associated subsections.

3.2.2.7.1.6 Printout of Data. Selected graphic and text data shall be printed from the OCC support subsystem.

3.2.2.7.1.7 Data Upload. The OCC support subsystem shall make available for upload to the NOCC any data collected by the OCC support subsystem.

3.2.2.7.1.8 OCC Resource M&C. All OCC support subsystem resources shall be monitored, controlled, and certified at the OCC.

3.2.2.7.1.9 Time Source. The OCC support subsystem time shall be synchronized to the same independent time source used by the STARS automation subsystem.

3.2.2.7.2 Multi-Site Monitoring Requirements

3.2.2.7.2.1 Remote Monitoring Activation. Data entry device input at the OCC support subsystem shall initiate concurrent remote monitoring of all selected STARS automation subsystems.

3.2.2.7.2.2 Number of Monitored Sites. The OCC support subsystem shall remotely monitor up to eighty (80) STARS automation subsystems simultaneously.

3.2.2.7.2.3 Multi-Site FSL Summary Display. The OCC support subsystem remote monitoring summary view shall concurrently display alarm, alert, or return-to-normal conditions for the FSL operations of each monitored STARS automation subsystem.

3.2.2.7.2.4 Multi-Site ESL Summary Display. The OCC support subsystem remote monitoring summary view shall concurrently display alarm, alert, or return-to-normal conditions for the ESL operations of each monitored STARS automation subsystem.

3.2.2.7.2.5 Multi-Site Event Notification Display. Event notifications for each monitored STARS automation subsystem shall be displayed concurrently in the OCC support subsystem remote monitoring summary view.

3.2.2.7.2.6 Interface Status Display. The OCC support subsystem remote monitoring summary view shall concurrently display the status of each OCC external interface.

3.2.2.7.2.7 Alarm/Alert Condition Indication. A visual indication, reinforced by an audible signal, shall be used to present alarm and alert conditions.

3.2.2.7.2.8 OCC Remote Monitoring View. Any OCC workstation shall display the summary view.

3.2.2.7.3 Remote M&C

3.2.2.7.3.1 Remote MCP Hosting. The MCP for any monitored STARS automation subsystem shall be hosted on an OCC support subsystem workstation.

3.2.2.7.3.2 Remote MCP Selection. The MCP of any monitored STARS automation subsystem shall be selected using pointer device input only.

3.2.2.7.3.3 Remote MCP Initiation. A single data entry device input shall initiate a selected remote MCP.

3.2.2.7.3.4 Number of MCPs. A single OCC support subsystem workstation shall support up to three simultaneous MCPs.

3.2.2.7.3.5 Number of OCC Workstations. The OCC support subsystem shall support simultaneous operations from up to five OCC support subsystem workstations.

3.2.2.7.3.6 Remote MCP Delay. Any selected remote MCP shall be available for use within one minute of data entry device input to the OCC support subsystem.

3.2.2.7.4 Remote Certification

3.2.2.7.4.1 Certification from the OCC. Remote certification of STARS automation subsystems shall be performed at the OCC in accordance with Section 3.2.2.4, Certification and its associated subsections.

3.2.2.9 Independent Time Source

3.2.2.9.1 Synchronization. STARS automated subsystem time shall be synchronized to an Independent Time Source.

3.2.2.10 System Operational Data Entry

3.2.2.10.1 Entry of System Operational Function Data. All command and data input associated with the system operational functions specified in Sections 3.2.2.1 through 3.2.2.9 shall be accepted at any MCP.

3.2.2.11 System Operational Data Display

3.2.2.11.1 Display of System Operational Function Data. Local and remote MCPs shall display the input and output data associated with the System Operational Functions specified in Sections 3.2.2.1 through 3.2.2.9.

3.2.2.11.2 Printout of System Operational Data. Local and remote MCPs shall, upon request by the operator, print the input and output data associated with the System Operational Functions specified in Sections 3.2.2.1 through 3.2.2.9.

3.2.2.12 ATC Operational Event Display

3.2.2.12.1 Display. Local and remote MCPs shall display the data associated with ATC operational events.

3.2.2.12.2 Print. Data associated with ATC operational events shall be printed.

3.2.2.12.3 Enable/Disable Notification. Notification of each enable/disable action shall be printed.

3.2.3 System Support Functions

3.2.3.1 Interfacility Test Function

3.2.3.1.1 Message Testing. The interfacility test function shall test interfacility message processing.

3.2.3.1.2 Interface Testing. The interfacility test function shall test interfacility interface operation.

3.2.3.1.3 Response Time Testing. The interfacility test function shall test interfacility message response times.

3.2.3.2 Simulation

3.2.3.2.1 Target Generation

3.2.3.2.1.1 Test and Training. The system shall simulate sensor/surveillance inputs for the purpose of system testing and controller training for FSL and ESL.

3.2.3.2.1.2 Simulation Sensor Input. The simulation function shall inject sensor/surveillance data at the radar interface into the STARS radar/surveillance input.

3.2.3.2.1.3 Primary Radar Data. Search radar target data shall be simulated.

3.2.3.2.1.4 Beacon Radar Data. Beacon radar target data shall be simulated.

3.2.3.2.1.5 Sensor Azimuth Data. Sensor azimuth data shall be simulated.

3.2.3.2.1.6 Blip/Scan Ratio. The blip/scan ratio shall be adjustable for each simulated sensor.

3.2.3.2.1.7 Sensor Noise. Sensor noise shall be adjustable for each simulated sensor.

3.2.3.2.1.8 Wind Conditions. The simulation function shall enable and disable the application of wind factors to all targets maintaining, climbing, and descending through an adaptable parameter below and above the controller specified altitude stratums for each simulated sensor.

3.2.3.2.1.9 Weather. Six levels of weather shall be simulated for each simulated sensor.

3.2.3.2.1.10 Wind Factors. Wind factors shall be affected by operator adjustable wind speed and wind direction spontaneously.

3.2.3.2.2 Simulation Modes

3.2.3.2.2.1 Simulation Environment. The simulation function shall provide on-line scenario generation tools that can execute concurrently with operational ATC functions.

3.2.3.2.2.2 Training Mode

3.2.3.2.2.2.1 Operational System. The simulation function shall include an on-line training mode which allows the simulation function to execute concurrently with the operational ATC functions.

3.2.3.2.2.2.2 Controller Training Interface. During on-line controller training, the training controller display setup and views shall be identical to those of the operational TCP.

3.2.3.2.2.2.3 Training Data. Display and manipulation of operational and training data shall occur independently at different TCWs and TDWs.

3.2.3.2.2.2.4 Training Mode Workload. The training mode shall provide simulated targets equal to 20% of the facility total aircraft system capacity or not less than 100 targets whichever is greater.

3.2.3.2.2.3 Test Mode

3.2.3.2.2.3.1 Non-Operational State. The test mode shall operate when STARS is in a non-operational, off-line state and is not accepting live system inputs.

3.2.3.2.2.3.2 Test Mode Workload. The test mode shall provide the capability to support a simulation of targets to verify the STARS workloads presented in this specification.

3.2.3.2.3 Simulation Commands

3.2.3.2.3.1 Target Characteristics

3.2.3.2.3.1.1 Beacon Code. A command shall change or initialize a specified target's beacon code.

3.2.3.2.3.1.2 Target Types. A command shall designate a specified target as beacon only, search only, or beacon-search reinforced.

3.2.3.2.3.1.3 Blip/Scan Ratio. A command shall be used to set criteria for simulated track's update rate based on the beacon and radar blip/scan ratio.

3.2.3.2.3.1.4 Ident. A command shall simulate an aircraft ident for a specified target.

3.2.3.2.3.1.5 Noise. A command shall enable and disable target position noise in range and azimuth for a selected sensor.

3.2.3.2.3.1.6 Target Report Inhibit. A command shall inhibit target reports for a specified target, report type including beacon or radar, and number of scans.

3.2.3.2.3.1.7 Report Quality. A command shall designate a specified target's report quality by setting the ARTS IIIA Quality field of the search and beacon report messages to the entered value.

3.2.3.2.3.2 Target Initiation and Termination

3.2.3.2.3.2.1 Simulated Target Creation. Simulated targets shall be established based on range and azimuth, X and Y coordinate, latitude/longitude, or TCP selected points.

3.2.3.2.3.2.2 Duplicate Targets. A command shall duplicate target reports for a specified target and number of duplicates.

3.2.3.2.3.2.3 Terminate Target. A command shall terminate one or more specified simulated targets.

3.2.3.2.3.2.4 Inhibit Target Termination. A command shall inhibit a specified target for automatic target termination.

3.2.3.2.3.2.5 Auto Final Approach and Termination. A command shall execute an automatic final approach and termination for a specified target, airport ID, runway number, glide slope, and altitude adjustment at inner marker.

3.2.3.2.3.2.6 Abbreviated Auto Final Approach and Termination. A command shall execute an abbreviated automatic final approach and termination that utilizes previously entered parameter values for the target specified in this entry.

3.2.3.2.3.2.7 Ring of Targets. A command shall automatically create a ring of symmetrically placed targets for a specified target, range, and number of targets.

3.2.3.2.3.3 Aircraft Movement

3.2.3.2.3.3.1 Altitude. A command shall change or initialize a target's altitude for a specified target, altitude, and altitude change rate.

3.2.3.2.3.3.2 Automatic Fix Descent. A command based on fix identifier, holding status, distance to descend, and current altitude shall cause all simulated targets currently in a hold pattern associated with the input fix to descend the entered distance using aircraft characteristic descent rates.

3.2.3.2.3.3.3 Heading. A command shall change or initialize a target's heading for a specified target, turn direction, current or new heading, and turn rate.

3.2.3.2.3.3.4 Holding. A command shall place a target in a holding pattern for a specified target, fix identifier, turn direction, turn rate, and outbound leg time.

3.2.3.2.3.3.5 No Gyro. A command shall place a target in a turn, until directed to stop, for a specified target, turn direction, and turn rate.

3.2.3.2.3.3.6 Speed. A command shall change or initialize a target's speed for a specified target and speed change rate.

3.2.3.2.3.4 Simulation Execution Control

3.2.3.2.3.4.1 Simulation Entries. Simulation entries shall be accepted from any TCP or MCP within the simulation environment.

3.2.3.2.3.4.2 Manual Entry. In training or test mode, all simulation commands and operational ATC entries shall be accepted.

3.2.3.2.3.4.3 Display Freeze. A command shall freeze TCW and TDW system data and display all data blocks and target symbols at the last updated position until the display freeze is disabled.

3.2.3.2.3.4.4 Fast Time. A command shall enable and disable a scenario to execute at 2, 4, 6, 8, and 10 speeds faster than real-time scenario execution.

3.2.3.2.3.4.5 Fast Time - Entries. All ATC operational and simulation command manual entries shall be processed during fast time scenario execution.

3.2.3.2.3.4.6 Scenario Enable/Disable by Target. A command shall enable/disable an aircraft and all associated scenario entries from further scenario entry processing while still allowing the scenario to execute all other scenario entries until the scenario has terminated or the aircraft is enabled for further scenario processing.

3.2.3.2.3.4.7 Scenario Initiate. A command shall initiate execution of a scenario beginning at any time during the scenario.

3.2.3.2.3.4.8 Scenario Termination. A command shall terminate a scenario execution.

3.2.3.2.3.4.9 Scenario Backup. A command shall allow a scenario to backup, to any given time interval in a scenario, during the scenario execution.

3.2.3.2.3.4.10 Simulated Sensors. A command shall individually activate and deactivate up to sixteen simulated sensor inputs from any mix of long or short range radar inputs.

3.2.3.2.3.4.11 Training System Time. A command shall set the training system time without affecting the operational ATC system time.

3.2.3.2.3.4.12 Multiple Scenarios. The simulation function shall execute multiple scenarios concurrently.

3.2.3.2.4 Scenario

3.2.3.2.4.1 Scenario Generation Tools. The simulation function shall execute scenario generation tools.

3.2.3.2.4.2 Stored Scenario. In training or test mode, all simulation and operational ATC entries shall have the capability to be stored in a scenario.

3.2.3.2.4.3 Scenario Storage. The simulation function shall store at least 100 scenarios with an average duration of 60 minutes.

3.2.3.2.4.4 Scenario-Manual Entry. In training or test mode, processing of manual entries from the TCW and TDW shall occur while a scenario is executing.

3.2.3.2.4.5 Aircraft Characteristics. The simulation function shall define at least 30 aircraft types which simulation commands use to assign default values to model the turn rate, altitude change rate including ascent/descent rate, and speed change rate including acceleration/deceleration rates.

3.2.3.2.4.6 Default Value Override. When explicit target control values are entered for a target, the entered value shall override default values that were assigned based upon the aircraft type.

3.2.3.2.4.7 Capture Simulation Activities. In training or test mode, all simulation activities shall be captured to be played back at a later time for review.

3.2.3.3 Data Reduction and Analysis (DR&A)

3.2.3.3.1 Selecting Data Reduction Information. MCP input shall select previously recorded information for data reduction and analysis based on data parameter, range of values, and time period.

3.2.3.3.2 Selection of Output Location. MCP input shall direct output information formulated by DR&A functions to any local or networked storage device, workstation, printer, or plotter.

3.2.3.3.3 Data Reduction and Analysis Functions

3.2.3.3.3.1 Summarization. MCP input shall allow the selected information to be summarized by average, median, or frequency, and sorted by multiple parameter keys.

3.2.3.3.3.2 Format Definition. MCP input shall define DR&A alphanumeric data output format.

3.2.3.3.3.3 Aircraft Track Plots. A plot of a specified subset of aircraft movement histories shall be generated upon request at the MCP from recorded target position or track data.

3.2.3.3.3.4 Charts and Graphs. MCP input shall select graphs and charts of DR&A data for printing or plotting.

3.2.3.4 On-Site Maintenance

3.2.3.4.1 Utilities, Tools, and Diagnostics

3.2.3.4.1.1 Software, Utilities and Tools. Utilities and tools shall execute on-site to detect and localize the source of software faults and failures.

3.2.3.4.1.2 Hardware Diagnostics. Diagnostics shall execute on-site to detect, and localize to the LRU, the source of hardware faults and failures.

3.2.3.4.1.3 Digital Map Utilities and Tools. Utilities and tools shall execute on-site to create, edit, delete and maintain electronic map data in NOAA format.

3.2.3.4.2 Software Maintenance

3.2.3.4.2.1 Software Evaluation

3.2.3.4.2.1.1 Run Time Errors. Software run time errors shall be detected, localized and reproduced on-site in the environment in which the errors occurred.

3.2.3.4.2.1.2 Data Archive. Pertinent data necessary to analyze faults and failures shall be saved after each occurrence of a run time error.

3.2.3.4.2.2 Software Management

3.2.3.4.2.2.1 Software Upload. Software components and baselines shall be transferred over the remote maintenance interfaces to the remote maintenance facilities.

3.2.3.4.2.2.2 Software Download. Software components and baselines shall be received over the remote maintenance interfaces from the remote maintenance facilities.

3.2.3.4.2.2.3 Data Upload. Adaptation and selected data shall be transferred over the remote maintenance interfaces to the remote maintenance facilities.

3.2.3.4.2.2.4 Data Download. Adaptation and selected data shall be received over the remote maintenance interfaces from the remote maintenance facilities.

3.2.3.4.2.2.5 On-Site Software Storage. Each STARS automation subsystem shall store at least three sets of site adapted software using a direct access, non-volatile electronic media.

3.2.3.4.3 Hardware Maintenance

3.2.3.4.3.1 Cyclic Execution of Diagnostics. MCP input shall initiate a specified number of executions of selected diagnostics.

3.2.3.4.3.2 Archive of Diagnostic Results. All diagnostic results shall be saved for future evaluation.

3.2.3.5 Off-Site Maintenance

3.2.3.5.1 General Maintenance Support

3.2.3.5.1.1 Monitor. The remote maintenance subsystems shall monitor the status and performance of the STARS automation subsystems in accordance with the requirements specified in 3.2.2.1, System Status Monitoring, and 3.2.2.2, System Performance Monitoring using a remote MCP hosted on an MCW or TCW at the remote maintenance facilities.

3.2.3.5.1.2 Control. The remote maintenance subsystems shall provide STARS automation subsystem control functionality in accordance with the requirements specified in 3.2.2.3, System Control using a remote MCP hosted on an MCW or TCW at the remote maintenance facilities.

3.2.3.5.1.3 Storage and Transfer

3.2.3.5.1.3.1 Software Storage. At least three complete versions of site adapted software shall be stored on-board the remote maintenance subsystems using non-volatile electronic media.

3.2.3.5.1.3.2 File Transfer. Selected data and software shall be transferred between STARS automation subsystems and remote maintenance subsystems over the remote maintenance interfaces.

3.2.3.5.2 Remote Maintenance Facilities

3.2.3.5.2.1 Operational Support Facility (OSF)

3.2.3.5.2.1.1 OSF Location. The OSFs shall be collocated with a STARS automation subsystem.

3.2.3.5.2.1.2 OSF Autonomy. The OSF maintenance subsystem shall operate autonomously from the collocated STARS automation subsystem.

3.2.3.5.2.1.3 OSF Maintenance Subsystem Configurations. The OSF maintenance subsystem shall simultaneously provide a software maintenance configuration (SMC) and software test configuration (STC).

3.2.3.5.2.1.4 OSF SMC

3.2.3.5.2.1.4.1 SMC Functionality. The OSF SMC shall support all OSF software maintenance activities necessary to maintain site adaptation, install new software releases, perform data reduction and analysis, and identify and verify PTRs.

3.2.3.5.2.1.4.2 SCSC Access. The OSF SMC shall be able to access software development capabilities at the SCSC.

3.2.3.5.2.1.4.3 OSF/SCSC Connectivity. The OSF support subsystem shall conduct dedicated operations with SCSC support subsystem via a GFE WAN.

3.2.3.5.2.1.4.4 Concurrent Operations. The OSF SMC shall support simultaneous remote maintenance operations with up to six STARS automation subsystems.

3.2.3.5.2.1.4.5 Remote MCP. The MCP for up to six selected STARS automation subsystems shall be hosted simultaneously on two or more OSF SMC workstations.

3.2.3.5.2.1.5 OSF STC

3.2.3.5.2.1.5.1 STC Functionality. The OSF STC shall support all OSF software testing activities necessary to maintain site adaptation, install new software releases, and identify and verify PTRs.

3.2.3.5.2.1.5.2 Automation Subsystem Configuration Replication. The OSF STC shall functionally replicate the hardware and software configuration of any fielded STARS automation subsystem for any site under the purview of the OSF.

3.2.3.5.2.1.5.3 Display Reconfiguration. The collocated STARS automation subsystem workstations shall be reconfigurable to the OSF STC.

3.2.3.5.2.1.6 Site Adaptation

3.2.3.5.2.1.6.1 Site Adaptation Implementation. The OSF maintenance subsystem shall support site-specific parameter adaptations, including parameter settings and software versions.

3.2.3.5.2.1.6.2 Site Adaptation Testing. The OSF maintenance subsystem shall support testing, evaluation, and validation of software site adaptations, including parameter settings and software versions.

3.2.3.5.2.1.6.3 Site Adaptation Configuration Management. The OSF maintenance subsystem shall support configuration management of software site adaptations, including parameter settings and software versions.

3.2.3.5.2.1.7 New Software Releases

3.2.3.5.2.1.7.1 New Software Release From SCSC. The OSF maintenance subsystem shall support downloading of baseline software upgrades or incremental software upgrades and their related documentation from the SCSC.

3.2.3.5.2.1.7.2 New Software Release To STARS Site. The OSF maintenance subsystem shall support downloading of site adapted baseline software upgrades or site adapted incremental software upgrades from the OSF to selected STARS automation subsystems.

3.2.3.5.2.1.7.3 New Software Release Testing. The OSF maintenance subsystem shall support the testing of site adapted baseline software upgrades or site adapted incremental software upgrades on a simulated STARS operational path.

3.2.3.5.2.1.7.4 OSF Software Storage. The OSF maintenance subsystem shall store at least three sets of site adapted software for each STARS automation subsystem using a direct access non-volatile electronic medium.

3.2.3.5.2.1.8 PTR Support

3.2.3.5.2.1.8.1 PTR Identification. The OSF maintenance subsystem shall support the verification of the PTRs for system problems identified at a STARS automation subsystem site.

3.2.3.5.2.1.8.2 PTR Supporting Data. The OSF maintenance subsystem shall support the management of PTR support data, including data collection, storage, and transfer from the OSF to the SCSC.

3.2.3.5.2.1.8.3 PTR Resolution. The OSF maintenance subsystem shall support verification of PTR resolutions received from the SCSC.

3.2.3.5.2.1.8.4 PTR Distribution. The OSF maintenance subsystem shall support the distribution of tested PTRs on the STARS automation subsystem sites.

3.2.3.5.2.2 STARS Central Support Complex (SCSC)

3.2.3.5.2.2.1 SCSC Location. The SCSC shall be located at the FAATC.

3.2.3.5.2.2.2 SCSC/OSF Connectivity. The SCSC maintenance subsystem shall conduct simultaneous dedicated operations with up to nine OSF maintenance subsystems.

3.2.3.5.2.2.3 Concurrent Operations. The SCSC maintenance subsystem shall conduct simultaneous remote maintenance operations with up to twelve STARS automation subsystems.

3.2.3.5.2.2.4 Remote MCP. The MCP for up to twelve selected STARS automation subsystems shall be hosted simultaneously on four or more SCSC maintenance subsystem workstations.

3.2.3.5.2.2.5 SCSC Autonomy. SCSC software development activities shall be autonomous from SCSC field support activities.

3.2.3.5.2.2.6 SCSC Maintenance Subsystem Configurations. The SCSC maintenance subsystem shall simultaneously provide a software development configuration (SDC) and a field support configuration (FSC).

3.2.3.5.2.2.7 Software Development Configuration (SDC)

3.2.3.5.2.2.7.1 SDC Functionality. The SDC shall support all software maintenance activities necessary to develop and implement new software releases, perform system wide adaptation, perform software configuration management and develop and implement Software Change Proposals (SCPs).

3.2.3.5.2.2.7.2 SDC Activities. The SDC shall support developmental software activities, including source generation and editing, compiling, building, debugging, data reduction and analysis, and testing of new functions and releases, performed by either local or remote operators.

3.2.3.5.2.2.7.3 System-Wide Adaptation. The SDC shall support the development, testing, implementation and distribution of system-wide STARS adaptations, comprising STARS software and system-wide adaptation files.

3.2.3.5.2.2.7.4 Software Baseline Validation and Distribution. The SDC shall support the validation and distribution of new software baseline and/or delta systems, and their related documentation, from the SCSC to the OSFs.

3.2.3.5.2.2.7.5 SDC Software Storage

3.2.3.5.2.2.7.5.1 Source Storage. The SDC shall store at least three sets of automation application source files, on-site/off-site maintenance utility source files, and CAS component files using a direct access non-volatile electronic medium.

3.2.3.5.2.2.7.5.2 Adaptation Storage. The SDC shall store at least three sets of adaptation parameter source files for each STARS automation subsystem using a direct access non-volatile electronic medium.

3.2.3.5.2.2.7.6 Software Configuration Management

3.2.3.5.2.2.7.6.1 Application Software Configuration Management. The SDC shall support the configuration management of application software at the SCSC.

3.2.3.5.2.2.7.6.2 CAS Configuration Management. The SDC shall support the configuration management of CAS components at the SCSC.

3.2.3.5.2.2.7.6.3 Track Software Changes. The automated configuration management function shall be able to track software changes from problem initiation through development, implementation, and fielding.

3.2.3.5.2.2.7.6.4 Visibility of Software Changes. The automated configuration management function shall provide visibility at any time to show how the code is changed by an authorized software change.

3.2.3.5.2.2.7.6.5 Authorization of Software Changes. The automated configuration management function shall provide security so that no changes to the software occur without authorization.

3.2.3.5.2.2.7.7 Software Change Proposal (SCP) Support

3.2.3.5.2.2.7.7.1 SCP Identification. The SDC shall support the identification, analysis and validation of SCPs.

3.2.3.5.2.2.7.7.2 SCP Development. The SDC shall support the design, development, testing and documentation of SCPs.

3.2.3.5.2.2.7.7.3 SCP Implementation. The SDC shall support the downloading of baseline software upgrades or incremental software upgrades resulting from the implementation of SCPs from the SCSC to the OSF.

3.2.3.5.2.2.8 Field Support Configuration (FSC)

3.2.3.5.2.2.8.1 FSC Functionality. The FSC shall support all maintenance activities necessary to complete software testing, hardware discrepancy identification, problem resolution, testing and configuration management, and PTR identification, resolution, and testing.

3.2.3.5.2.2.8.2 Automation Subsystem Configuration Replication. The SCSC FSC shall functionally replicate the hardware and software configuration of any fielded STARS automation subsystem.

3.2.3.5.2.2.8.3 Hardware Discrepancy Report (HDR). The FSC shall support the identification and resolution of HDRs.

3.2.3.5.2.2.8.4 COTS Hardware Configuration Management. The FSC shall support COTS hardware configuration management at the SCSC.

3.2.3.5.2.2.8.5 PTR Support

3.2.3.5.2.2.8.5.1 PTR Identification. The FSC shall support the identification, verification, and analysis of PTRs.

3.2.3.5.2.2.8.5.2 PTR Database. The FSC shall support the maintenance of an OSF-accessible PTR database.

3.2.3.5.2.2.8.5.3 PTR Supporting Data. The FSC shall support the collection and storage of supporting data for PTR analysis.

3.2.3.5.2.2.8.5.4 PTR Resolution. The FSC shall support the design, development, testing, and documentation of PTR resolutions.

3.2.3.5.2.2.8.5.5 Resolution Download. The FSC shall support downloading of PTR resolutions to the OSF.

3.2.3.5.3 Software Maintenance Tools

3.2.3.5.3.1 Development Tools

3.2.3.5.3.1.1 Development Environment. The STARS native development environment shall execute at the remote maintenance facilities to support source generation and editing, compiling, building, debugging, and testing of application software.

3.2.3.5.3.1.2 Requirements Management Tool. An integrated computer-based tool shall execute at the SCSC to trace system requirements from the functional/performance requirement level to the computer software unit level and vice versa.

3.2.3.5.3.1.3 CAS-Integration. Utilities and tools shall execute at the remote maintenance facilities to support the integration of application software with approved CAS products.

3.2.3.5.3.2 Test and Release Tools

3.2.3.5.3.2.1 Software Test and Validation. Tools shall execute at the remote maintenance facilities to support testing, evaluation, and validation of application software and CAS.

3.2.3.5.3.2.2 Distribution and Release. Tools shall execute at the remote maintenance facilities to support the distribution and release of application software and CAS.

3.2.3.5.3.3 Configuration Management (CM) Tools

3.2.3.5.3.3.1 Software CM. Tools shall execute at the remote maintenance facilities to support configuration management of application software and CAS components.

3.2.3.5.3.3.2 Adaptation CM. Tools shall execute at the remote maintenance facilities to support configuration management of software site adaptations, including parameter settings and software versions.

3.2.3.5.3.3.3 Simulation Scenario CM. Tools shall execute at the remote maintenance facilities to support configuration management of simulation scenarios.

3.2.3.5.3.3.4 System Backup. Utilities and tools shall execute at the remote maintenance facilites to back up system files.

3.2.3.5.3.4 Diagnostic Tools

3.2.3.5.3.4.1 Run Time Errors. Utilities and tools shall execute at the remote maintenance facilities to detect and localize software run time errors and reproduce the environment in which errors occurred.

3.2.3.5.3.4.2 Software Fault Analysis. Utilities and tools shall execute at the remote maintenance facilities to detect and isolate the source of all software faults and failures which occur within any selected STARS automation subsystem.

3.2.3.5.3.4.3 Data Analysis. Utilities and tools shall execute at the remote maintenance facilities to support the analysis, printing, or viewing of data.

3.2.3.5.3.4.4 Simulation. The simulation functions described in Section 3.2.3.2, Simulation, shall be available at the remote maintenance facilities.

3.2.3.5.3.5 PTR and SCP Tools. Tools shall execute at the remote maintenance facilities to support the identification and resolution of PTRs and SCPs.

3.2.3.5.3.6 Site Adaptation Tools

3.2.3.5.3.6.1 Site Adaptation Creation. Tools shall execute at the remote maintenance facilities to support the creation of software site adaptations, including parameter settings and software versions.

3.2.3.5.3.6.2 Site Adaptation Test and Validation. Tools shall execute at the remote maintenance facilities to support testing, evaluation, and validation of software site adaptations, including parameter settings and software versions.

3.2.3.5.3.6.3 Digital Map Format. Utilities at the remote maintenance facilities shall be capable of interpreting Government furnished digital maps in either pixel or vector format as defined by the Advanced Automation System Static Information Format Agreement, Pixel Data (ASIFA-P) and Vector Data (ASIFA-V).

3.2.3.5.4 Hardware Maintenance Tools

3.2.3.5.4.1 HDR Identification/Resolution. Tools shall execute at the remote maintenance facilities to support the identification and resolution of HDRs.

3.2.3.5.4.2 Hardware Diagnostics. Diagnostics shall execute at the remote maintenance facilities to detect, and localize to the LRU, the source of hardware faults and failures.

3.2.3.5.4.3 COTS Hardware Test and Verification. Tools shall execute at the remote maintenance facilities to test and verify COTS hardware.

3.2.3.5.4.4 COTS Hardware Configuration Management. Tools shall execute at the remote maintenance facilities to support configuration management of COTS hardware.

3.2.3.6 System Support Data Entry

3.2.3.6.1 Entry of System Support Function Data. All command and data input associated with the System Support Functions specified in Sections 3.2.3 shall be accepted at any MCP.

3.2.3.7 System Support Data Display

3.2.3.7.1 Display of System Support Function Data. Local and remote MCP shall display the input and output data associated with the System Support Functions specified in Sections 3.2.3.

3.2.4 System Performance

3.2.4.1 Workload

3.2.4.1.1 Automation Subsystem Workload. The automation subsystem shall process the workload specified in Section 20, Table 15 through Table 21.

3.2.4.1.2 Individual Data Display Workload. The TCW or TDW shall display the individual data workload specified in Section 20, Table 22.

3.2.4.1.3 Simultaneous Data Display Workload. The TCW or TDW shall display the simultaneous data workload specified in Section 20, Table 23.

3.2.4.1.4 SCSC/OSF Workload

3.2.4.1.4.1 Software Change Proposals (SCPs). The SCSC and OSF maintenance subsystems shall be sized for the implementation of 50 SCP resolutions per year at an average of 300 source lines of code (SLOC) per SCP resolution.

3.2.4.1.4.2 Program Trouble Reports (PTRs). The SCSC and OSF maintenance subsystems shall be sized for the implementation of 200 PTR resolutions per year at an average of 50 (SLOC) per PTR resolution.

3.2.4.1.4.3 Baseline Software Upgrades. The SCSC and OSF maintenance subsystems shall be sized for the implementation and release of one baseline site adapted software upgrade per year.

3.2.4.1.4.4 Incremental Software Upgrades. The SCSC and OSF maintenance subsystems shall be sized for the implementation and release of 12 incremental site adapted software upgrades per year.

3.2.4.2 Response Times and Update Rates

3.2.4.2.1 Dependence on Workload

3.2.4.2.1.1 Simultaneous. Conformance to the response times and update rates specified in this section shall be obtained while the system executes at all the system and simultaneous data display workload levels specified in Section 20, Table 15 through Table 21 and Table 23.

3.2.4.2.1.2 Individual. Conformance to the response times and update rates specified in this section shall be obtained while the system executes at all the system workload levels specified in Section 20, Table 15 through Table 21, and any individual data display workload value in Table 22.

3.2.4.2.2 Response Time and Update Rate Definitions. All response time and update rate requirements shall be defined as the values at the 95th percentile.

3.2.4.2.3 Response Times

3.2.4.2.3.1 Data Entry Device Response Times

3.2.4.2.3.1.1 Alphanumeric Input Devices. At any workstation, the time from the input of a character to its display shall be less than or equal to 100 milliseconds.

3.2.4.2.3.1.2 Pointing Device Actuation Response Time. An indication that a pointing device was actuated shall be provided at displays in 100 milliseconds or less after the device is actuated.

3.2.4.2.3.1.3 Pointing Device Moving Response Time. An indication that a pointing device was moved shall be provided at displays in 100 milliseconds or less after the device is moved.

3.2.4.2.3.2 ATC Operational Data Display Response Times

3.2.4.2.3.2.1 Local ATC Data Display. Local display of target position and data block information shall occur within 1.0 second of receipt of target data by the STARS automation subsystem.

3.2.4.2.3.2.2 Remote ATC Data Display. Remote display of target position and data block information shall occur within 1.0 second of receipt of target data by the STARS automation subsystem, plus measured delay due to GFE communications devices.

3.2.4.2.3.3 M&C Data Display Response Time

3.2.4.2.3.3.1 Display of Single Site Event Notifications. Local or remote display at the MCP of single-site event notification shall occur within 3 seconds of the occurrence of each event, plus measured delay due to GFE devices at remote displays.

3.2.4.2.3.3.2 Display of Multi-Site Event Notification. Indication of existing alarm, alert and return-to-normal conditions for any monitored STARS shall be displayed for multi-site event notification display by the OCC support subsystem within ten seconds of its occurrence plus measured delay due to GFE communications devices.

3.2.4.2.3.3.3 Display of Certification Report. Local or remote display at the MCP of all certification result reports shall occur within 5 minutes of the completion of any certification test, plus measured delay due to GFE devices at remote displays.

3.2.4.2.3.3.4 TCW Replay Initial Response. When a workstation replay is requested, it shall be available for display within five minutes of the request.

3.2.4.2.3.4 Command Processing Response Times

3.2.4.2.3.4.1 Local TCP Request Response Times. The functions requested by TCP input from a local workstation shall be completed and the results displayed in 1.2 seconds or less.

3.2.4.2.3.4.2 Remote TCP Request Response Times. The functions requested by TCP input from a remote workstation shall be completed and the results displayed in 1.2 seconds or less, plus measured delay due to GFE communication devices.

3.2.4.2.3.4.3 MCP Request Response Times. An indication of the progress of functions requested by MCP input shall be displayed every 1.2 seconds until the function has completed.

3.2.4.2.3.5 Interfacility Data Transfer Response Times

3.2.4.2.3.5.1 Interfacility Message Transmission. Automatically and manually initiated interfacility messages shall begin transmission within 1.2 second after the transmission request is initiated.

3.2.4.2.3.5.2 Processing Received Interfacility Messages. Processing and display required for interfacility messages shall be accomplished within 1.2 second of message receipt.

3.2.4.2.3.5.3 Response to Interfacility Message. Transmission of responses to interfacility messages shall begin within 1.2 seconds of message receipt.

3.2.4.2.3.6 Service Certification Response Time. Service certification shall be completed within 45 minutes of initiation.

3.2.4.2.4 Update Rates

3.2.4.2.4.1 Map Data Display Update Rate. The map data display update rate shall be 1000 lines and 200 symbols per second.

3.2.4.2.4.2 Weather Map Update. Any change to the weather map shall be displayed at the TCW in 30 seconds or less.

3.2.4.3 Transition Times

3.2.4.3.1 Service Level Transitions. The change of display between ESL and FSL information shall occur in 500 milliseconds or less after the change is initiated by a TCP.

3.2.4.3.2 Time For Switching Resources. Switching the resource state shall be accomplished in five (5) seconds or less.

3.2.4.3.3 Switching Application Software. Switching between two versions of automation application software shall take no more than 45 seconds.

3.2.4.3.4 Switching Adaptation Data. Switching between two sets of site adaptation data shall take no more than 10 seconds.

3.2.4.3.5 Automation Subsystem Initialization Times

3.2.4.3.5.1 To ESL. Initialization to ESL shall be accomplished in sixty (60) seconds or less excluding M&C functionality.

3.2.4.3.5.2 To FSL. Initialization to FSL shall be accomplished in six (6) minutes or less.

3.2.4.3.6 Recovery Times

3.2.4.3.6.1 Recovery Time From Power Failure

3.2.4.3.6.1.1 Time From Power Restored To ESL. From the time power is restored, recovery to ESL shall be accomplished in sixty (60) seconds or less, excluding M&C functionality.

3.2.4.3.6.1.2 Time From Power Restored To FSL. From the time power is restored, recovery to FSL shall be accomplished in six (6) minutes or less.

3.2.4.3.6.2 Recovery Time To Current Service Level. From the time a redundant system resource fails, recovery to the service level in use at the time of the failure shall be accomplished in five (5) seconds or less.

3.2.4.4 Tracking and Safety Algorithm Performance

3.2.4.4.1 Displayed Target Position Accuracy. The displayed relative target position accuracy including all surveillance, processing, and display errors shall be less than or equal to 0.125nm or less than or equal to 0.4% of range.

3.2.4.4.2 Tracking Performance. Tracking performance shall conform to the requirements specified in Section 10, Table 3 through Table 12 using surveillance sensor inputs with the characteristics specified in Section 10, Table 1 and for aircraft motion characteristics as specified in Section 10, Table 2.

3.2.4.4.3 Conflict Alert Performance. Conflict Alert performance shall conform to the requirements specified in Section 10, Table 13, with a nuisance alert rate of less than or equal to 6%, using surveillance sensor inputs with the characteristics specified in Section 10, Table 1 and for aircraft motion characteristics as specified in Section 10, Table 2.

3.2.4.4.4 Final Monitor Aid (FMA) Performance

3.2.4.4.4.1 Runways. FMA shall support simultaneous approach operations on four parallel runways per airport in both directions for a total of eight runways per airport.

3.2.4.4.4.2 Aircraft. FMA shall support approach operations for 75 aircraft per airport in each direction for a total of 150 aircraft per airport.

3.2.4.4.4.3 Tracked Target Deviations. FMA shall support detection of target deviations of 100 feet on final course.

3.2.4.4.5 MSAW Performance. Minimum Safe Altitude Warning performance shall conform to the requirements specified in Section 10, Table 14 using surveillance sensor inputs with the characteristics specified in Section 10, Table 1 and for aircraft motion characteristics as specified in Section 10, Table 2.

3.2.4.4.6 CRDA Performance. CRDA shall operate on a total of 8 applications per airport.

3.2.4.5 Time Accuracy of Recorded Data

3.2.4.5.1 Synchronization Accuracy. The time associated with all recorded data shall be synchronized to within 100 msec of the ITS time.

3.3 System External Interfaces

3.3.1 System External Interfaces - General

3.3.1.1 External Interface Standards. External system interfaces shall comply with EIA, IEEE, ISO, ITU-T, or NIST standards.

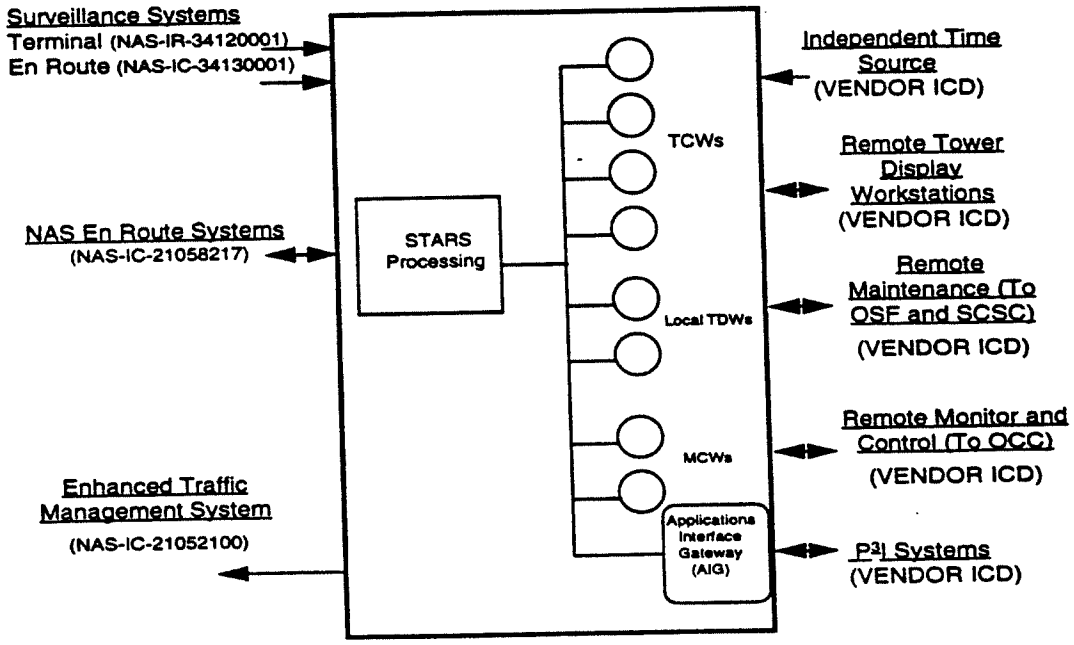
3.3.1.2 Interface Diagram. The automation subsystem shall interface to the external systems as shown in Figure 2, System External Interfaces.

3.3.2 Digital Surveillance Systems Interfaces

3.3.2.1 Digital Surveillance Systems Interfaces - General

3.3.2.1.1 Number of Digital Surveillance Systems Interfaces. The digital surveillance systems interfaces shall accept data from up to 16 digital surveillance systems in any combination of terminal and en route radars.

FIGURE 2 System External Interfaces



3.3.2.1.2 Primary and Backup Digital Surveillance Systems Interfaces. One primary interface and one independent backup interface shall provide connectivity between the STARS automation subsystem and each digital surveillance system.

3.3.2.2 Terminal Surveillance Systems Interface. The terminal surveillance systems interface shall be implemented in accordance with the Terminal Surveillance Radar/Terminal Air Traffic Control System IRD, NAS-IR-34120001.

3.3.2.3 En Route Surveillance Systems Interface. The en route surveillance systems interface shall be implemented in accordance with the En Route Surveillance Radar/Terminal Air Traffic Control System ICD, NAS-IC-34130001.

3.3.3 Terminal/En Route Interfacility Interface

3.3.3.1 Number of Terminal/En Route Interfacility Interfaces. Up to eight terminal/en route interfacility interfaces shall exchange data with NAS en route systems.

3.3.3.2 Terminal/En Route Interfacility Interface Characteristics. The terminal/en route interfacility interface shall be implemented in accordance with the NAS Terminal/En Route Interfacility ICD, NAS-IC-21058217.

3.3.4 Enhanced Traffic Management System (ETMS) Interface

3.3.4.1 Number of ETMS Interfaces. The ETMS interface shall exchange data with one Traffic Management Unit (TMU).

3.3.4.2 ETMS Interface Characteristics. The ETMS interface shall be implemented in accordance with the Standard Terminal Automation Replacement System/Enhanced Traffic Management System ICD, NAS-IC-21052100.

3.3.5 Independent Time Source Interface

3.3.5.1 Number of Independent Time Source Interfaces. One Independent Time Source Interface shall accept data from a calibrated national standard time source.

3.3.5.2 Independent Time Source Characteristics. The Independent Time Source Interface shall be implemented in accordance with a vendor defined ICD.

3.3.6 Remote TDW Interface

3.3.6.1 Number of TDW Interfaces. The STARS automation subsystem shall interface with up to 36 remote TDWs.

3.3.6.2 Remote TDW Interface Protocol. The remote TDW interface shall comply with any standard data communication protocol approved by EIA, IEEE, ISO, ITU-T, or NIST.

3.3.6.3 Remote TDW Interface Characteristics. The remote TDW interface shall be implemented in accordance with a vendor defined ICD.

3.3.6.4 Remote TDW/Terminal Surveillance System Interface. Remote TDWs shall interface with a direct terminal surveillance system interface as specified in the Terminal Surveillance Radar/Terminal Air Traffic Control System IRD, NAS-IR-34120001.

3.3.7 Remote Maintenance Interface

3.3.7.1 Number of Remote Maintenance Interfaces. The STARS automation subsystem shall provide two identical remote maintenance interfaces; one providing connectivity between the automation subsystem and an OSF maintenance subsystem, and one providing connectivity between the automation subsystem and the SCSC maintenance subsystem.

3.3.7.2 Remote Maintenance Interface Connectivity. The remote maintenance interface shall provide dial-up connectivity.

3.3.7.3 Remote Maintenance Interface Protocol. The remote maintenance interface shall comply with any standard data communication protocol approved by EIA, IEEE, ISO, ITU-T, or NIST.

3.3.7.4 Remote Maintenance Interface Characteristics. The remote maintenance interface shall be implemented in accordance with a vendor defined ICD.

3.3.7.5 Remote MCP. The remote maintenance interface shall support real-time remoting of the MCP to an OSF and the SCSC.

3.3.7.6 Software Upload/Download. The remote maintenance interface shall support software upload and download between the STARS automation subsystem and the OSF maintenance subsystem, and between the STARS automation subsystem and the SCSC maintenance subsystem.

3.3.7.7 Data Upload/Download. The remote maintenance interface shall support the upload and download of selected data between the STARS automation subsystem and the OSF maintenance subsystem, and between the STARS automation subsystem and the SCSC maintenance subsystem.

3.3.8 Remote Monitor and Control Interface

3.3.8.1 Number of Remote Monitor and Control Interfaces. The STARS automation subsystem shall provide one interface between the automation subsystem and an OCC support subsystem.

3.3.8.2 Remote Monitor and Control Interface Connectivity. The remote monitor and control interface shall provide continuous connectivity at a data rate up to 1.544 Mbps.

3.3.8.3 Remote Monitor and Control Interface Protocol. The remote monitor and control interface shall comply with any standard data communication protocol approved by EIA, IEEE, ISO, ITU-T, or NIST.

3.3.8.4 Remote Monitor and Control Interface Characteristics. The remote monitor and control interface shall be implemented in accordance with a vendor defined ICD.

3.3.8.5 Remote MCP. The remote monitor and control interface shall support real-time remoting of the MCP to an OCC.

3.3.8.6 Remote TCP. The remote monitor and control interface shall support real-time remoting of the TCP to an OCC for the purposes of performing remote certification.

3.3.8.7 Data Upload/Download. The remote monitor and control interface shall support the upload and download of selected data between the STARS automation subsystem and the OCC support subsystem.

3.3.9 Applications Interface Gateway

3.3.9.1 Number of AIG Interfaces. The AIG shall provide independent, bi-directional communication pathways between the STARS automation subsystem and up to sixteen external systems.

3.3.9.2 AIG Interface Connectivity. Each AIG interface shall provide either dial-up or continuous connectivity.

3.3.9.3 AIG Interfaces Protocols. Each AIG interface shall comply with any standard data communication protocol approved by EIA, IEEE, ISO, ITU-T, or NIST.

3.4 System Internal Interfaces

3.4.1 Internal Interfaces Protocol. All internal interfaces shall comply with any standard data communications protocol approved by EIA, IEEE, ISO, ITU-T, or NIST.

3.4.2 Internal Interface Characteristics. All internal interfaces shall be implemented in accordance with a vendor defined ICD.

3.5 System Internal Data Requirements (Not Applicable)

3.6 Adaptation

3.6.1 Operational Parameter Values. Software adaptation shall be employed to set system-wide and site-specific operational parameters.

3.6.2 Adaptation Parameter Change Control. Access to change adaptation parameter data shall be controlled.

3.6.3 Adaptable Parameter Type. The adaptation type of an adaptable parameter shall be adaptable.

3.6.4 Parameter Value Defaults. Each site specific adaptable parameter shall be assigned a default value.

3.6.5 Parameter Value Ranges. An acceptable range of values shall be assigned to each site-specific adaptable parameter.

3.6.6 Parameter Value Validation. All adaptable parameter values shall be validated against the acceptable range of values.

3.6.7 Parameter Value Validation Errors. All errors which result from parameter value validation process shall be reported to the operator.

3.6.8 Parameter Value Dependency Validation. The combination of values selected for a set of system-wide or site-specific adaptable parameters shall be validated by the system prior to acceptance and implementation.

3.6.9 Implementation of Site Adaptation Changes. Site adaptation changes shall be implemented, accepted and employed without the need for software recompilation or reload of the entire operational program.

3.7 Safety

3.7.1 Personnel Safety

3.7.1.1 Safety Features of System Equipment Design. The design of system equipment shall contain safety features which comply with UL1950.

3.7.1.2 Radio Frequency/Microwave, X, and Laser Radiation Limits. The design of system equipment shall comply with FAA-G-2100F, 3.3.6.2 and associated subsections.

3.7.1.3 Noise Criteria

3.7.1.3.1 Operational Areas. Equipment installed in operational areas shall meet requirements specified in FAA-G-2100F, 3.3.7.1.1.

3.7.1.3.2 Equipment Areas. Equipment installed in equipment areas shall meet the requirements specified in FAA-G-2100F, 3.3.7.1.2.

3.7.2 Hazardous Materials

3.7.2.1 Toxic Hazards. All system components shall be free of toxic hazards as specified in MIL-STD-1472D, 5.13.7.4.

3.7.2.2 Gases. No materials installed in the equipment shall liberate gases which combine with the atmosphere to form an acid or corrosive alkali.

3.7.2.3 Fumes. No materials installed in the equipment shall liberate toxic or corrosive fumes which would be detrimental to the performance of the equipment or health of personnel.

3.7.2.4 Explosive Atmosphere. No materials installed in the equipment shall liberate gases which produce an explosive atmosphere.

3.7.2.5 Mercury. No materials or parts containing mercury shall be used.

3.7.2.6 Cadmium. Plating and devices using cadmium shall be prohibited for use.

3.7.2.7 Glass Fiber. No glass fiber materials which cause skin irritation to operating personnel shall be used as the outer surface or covering on cables, wire or other items.

3.7.3 Physical Safety. The system shall comply with UL1950, Section 4 and associated subsections.

3.7.4 Electrical Safety. Electrical systems shall comply with UL1950, Section 2.

3.7.5 Cabling and Connections. All cabling and connections shall be installed in such a manner so as not to impede daily operations.

3.7.6 National Electrical Code Adherence. Cable installation shall be in accordance with National Electrical Code, NFPA 70.

3.7.7 Fire Resistance. The system shall be in accordance with UL1950, Section 4.4.

3.8 Physical Security Requirements (Not Applicable)

3.9 System Environment

3.9.1 Equipment in Conditioned Facility

3.9.1.1 Air Filters. Air filters shall comply with FAA-G-2100F, 3.1.3.5.1.

3.9.1.2 TRACON Operating Conditions. System resources located in the TRACON operations and equipment areas shall operate under the ambient conditions listed in FAA-G-2100F, Table III, Environment V, with the following exception: altitude range of 0 feet to 8000 feet above sea level.

3.9.1.3 Tower Operating Conditions. System resources located in the tower cab operations and equipment areas shall operate under the ambient conditions listed in FAA-G-2100F, Table III, Environment I, with the following exceptions:

a) Temperature range of 10 degrees to 40 degrees Celsius for all resources except the TDW display.

b) Temperature range of 10 degrees to 50 degrees Celsius for the TDW display.

c) Altitude range of 0 feet to 8000 feet above sea level.

3.9.1.4 Electrostatic Discharge

3.9.1.4.1 Service Interruptions Due to Discharge. No system failures or service interruptions shall occur due to electrostatic discharge under the following conditions:

a) While in a non-operating state, when subjected to either a voltage discharge of 12 KV, as stored in a 100 pf capacitor and discharged to the equipment case through a series impedance of 100 ohms, or a transient current with an energy content of 7.2 millijoules.

b) During operation, when subjected to either a voltage discharge of 7 KV, as stored in a 100 pf capacitor and discharged to the equipment case through a series impedance of 500 ohms, or a transient current with an energy content of 2.45 millijoules.

3.9.2 Thermal Design. The thermal design of the system shall be in accordance with FAA-G-2100F, 3.1.3.5.2, 3.1.3.5.3.

3.9.3 Non-Operating Conditions. The environmental values for non-operational system equipment shall be in accordance with FAA-G-2100F, 3.2.1.2.4 with the following exceptions:

a) Maximum non-operational temperature of 56 degrees Celsius.

b) Minimum non-operational temperature of -40 degrees Celsius.

3.10 Computer Resources

3.10.1 Processor Utilization. The average measured central processing unit idle time of each processing component shall be greater than or equal to fifty percent (50%) when measured at 10 second intervals, over a one hour period, while operating at the STARS workload and response times defined in Section 3.2.4, System Performance.

3.10.2 Memory Utilization. The average measured utilization of physical random access memory (RAM) and/or virtual memory for each processing component shall be less than or equal to seventy-five percent (75%) when measured at 60 second intervals, over a one hour period, while operating at the STARS workload and response times defined in Section 3.2.4, System Performance.

3.10.3 Physical Memory Expansion. The physical RAM for each processing component shall be expandable by at least one hundred percent (100%) of the delivered level by adding plug-in modules.

3.10.4 On-line Storage Utilization

3.10.4.1 Available Space. On-line storage capacity used for all functionality except data recording shall be less than or equal to fifty percent (50%) of maximum capacity, while operating under the conditions defined in Section 3.2.2.5.1.3, Twenty-Four Hour Recording.

3.10.5 Network Utilization. The average measured utilization as a percentage of total capacity of local area network(s)(LAN) shall be less than or equal to fifty percent (50%) when measured at 60 second intervals, over a one hour period, while operating at the STARS workload and response times defined in Section 3.2.4, System Performance.

3.11 System Quality Factors

3.11.1 Availability

3.11.1.1 STARS Automation Subsystem

3.11.1.1.1 FSL Configuration

3.11.1.1.1.1 ATC Operational Functionality. The configuration which provides FSL ATC Operational functionality shall have an inherent hardware availability greater than or equal to .999 995.

3.11.1.1.1.2 System Operational Functionality. The configuration which provides FSL System Operational functionality, excluding OCC Support Subsystem functionality, shall have an inherent hardware availability greater than or equal to .999 995.

3.11.1.1.1.3 System Support Functionality. The configuration which provides FSL System Support functionality, shall have an inherent hardware availability greater than or equal to .999.

3.11.1.1.2 ESL Configuration. The configuration which provides ESL ATC Display functionality and ESL Monitor and Control functionality shall have an inherent hardware availability greater than or equal to .999 995.

3.11.1.2 OSF Maintenance Subsystem. The configuration which provides OSF Maintenance Subsystem functionality shall have an inherent hardware availability greater than or equal to .999.

3.11.1.3 SCSC Maintenance Subsystem. The configuration which provides SCSC Maintenance Subsystem functionality shall have an inherent hardware availability greater than or equal to .999.

3.11.1.4 OCC Support Subsystem. The configuration which provides OCC Support Subsystem functionality shall have an inherent hardware availability greater than or equal to .999.

3.11.2 Reliability

3.11.2.1 Single Point Of Failure. The STARS automation subsystem design shall preclude any single point failures, excluding TCWs, MCWs, and TDWs.

3.11.2.2 First Site

3.11.2.2.1 STARS Automation Subsystem. The reliability of the ESL and FSL configuration shall be as specified in Section 30, Table 24 for the first site delivery.

3.11.2.2.2 Component. The reliability of any component shall be as specified in Section 30, Table 25 for the first site delivery.

3.11.2.3 Twentieth Site

3.11.2.3.1 STARS Automation Subsystem. The reliability of the ESL and FSL configuration shall be as specified in Section 30, Table 26 for the twentieth site delivery.

3.11.2.3.2 Component. The reliability of any component shall be as specified in Section 30, Table 27 for the twentieth site delivery.

3.11.3 Maintainability

3.11.3.1 Corrective Maintainability

3.11.3.1.1 Mean Repair Time. The mean time to repair (MTTR) for all components in any STARS subsystem shall be no greater than 0.5 hours.

3.11.3.1.2 Maximum Repair Time. The maximum time to repair for all components in any STARS subsystem shall be no greater than 1.5 hours.

3.11.3.2 Preventive Maintainability

3.11.3.2.1 Preventive Maintenance Frequency. Preventive maintenance on any STARS subsystem shall not be required more often than one time every three months.

3.11.3.2.2 Preventive Maintenance Time. Preventive maintenance on any STARS subsystem shall not require more than 2 staff hours of continuous effort by one individual.

3.12 Design and Construction

3.12.1 Architectural

3.12.1.1 Enhanceability. The system shall provide the capability to add, delete, and adapt hardware and software components to provide new and/or improved functionality, capacity and/or performance without change to the architecture.

3.12.1.2 Scalability. The system shall provide the capacity to add, delete, adapt resources in order to implement a tailored terminal automation system with the capacity, functionality and performance required to provide adequate air traffic control service under a specified air traffic load.

3.12.2 Hardware

3.12.2.1 General Hardware Constraints

3.12.2.1.1 Connections

3.12.2.1.1.1 Cable Connections. External cable connections, excluding data entry sets and maintenance connections, shall be on or accessible from the rear panel from any workstation.

3.12.2.1.1.2 Data Entry Device Connections. Connections for data entry sets shall be from the front of any workstation.

3.12.2.1.1.3 Maintenance Equipment Connections. Connections for maintenance equipment shall be mounted on the front of any workstation.

3.12.2.1.2 Aural Signal. All workstations shall be capable of generating aural signals as specified in Section 3.13.1.3.4.6, Auditory Coding.

3.12.2.1.3 Data Entry Device Replacement. Replacement of any workstation data entry device shall be accomplished without requiring a restart or reload of any non-workstation hardware or software component.

3.12.2.1.4 Graphics Processing Component

3.12.2.1.4.1 Controller/Generator. All workstations shall present data on their associated displays at the addressable resolution through the use of a graphics controller/generator.

3.12.2.1.4.2 Graphics Characteristics. The graphics controller/generator shall provide primitives to support the computer human interface requirements of Section 3.13.1, Computer Human Interface.

3.12.2.1.5 Color. All workstations shall be capable of displaying a minimum of 256 colors.

3.12.2.1.6 Keyboard Physical Characteristics. When a keyboard is provided as the alphanumeric entry device, it shall be in accordance with MIL-STD-1472D, 5.4.3.1.3 and its associated subsections.

3.12.2.1.7 Touch Screen Physical Characteristics. When a touch screen is provided as the alphanumeric entry device, it shall be in accordance with MIL-STD-1472D, 5.4.6 and its associated subsections.

3.12.2.1.8 Alphanumeric Entry Devices

3.12.2.1.8.1 Readability. The alphanumeric entry device shall be readable in all TRACONS and tower ambient light conditions without modification to the facility.

3.12.2.1.8.2 Configurations. The alphanumeric entry device shall be available in two configurations: (a) non-illuminated (b) self-illuminated.

3.12.2.1.8.3 Self-Illuminated. The device shall be self-illuminated so that each key is clearly visible in the dark.

3.12.2.1.8.4 Illumination-Control. The intensity of the illumination in the self-illuminated device shall be continously variable from off to full intensity.

3.12.2.1.9 Pointer Device

3.12.2.1.9.1 Mouse Standards. When a mouse is used, the device shall be in accordance with MIL-STD-1472D, 5.4.3.2.6.

3.12.2.1.9.2 Trackball Standards. When a trackball is used, the device shall be in accordance with MIL-STD-1472D, 5.4.3.2.4.

3.12.2.1.10 Special Tools. Special tools shall be in accordance with FAA-G-2100F, 3.3.1.3.5.5 and its associated subsections.

3.12.2.2 Terminal Controller Workstation

3.12.2.2.1 Data Entry Devices

3.12.2.2.1.1 Data Entry Set. A data entry set shall contain, at a minimum, an alphanumeric device and a pointer device.

3.12.2.2.1.2 Multiple Data Entry Sets. The TCW shall allow for the interface of up to three data entry sets.

3.12.2.2.1.3 Device Failure. A data entry device failure shall have no effect on the operation of any other device in the associated data entry set nor on other data entry sets.

3.12.2.2.2 Display Characteristics

3.12.2.2.2.1 Ambient Light. The TCW display shall be legible in an environment with high ambient (50 foot-candles) artificial light conditions, and low ambient (5 foot-candles) light conditions.

3.12.2.2.2.2 Resolution. The TCW display shall have a minimum display resolution of 2048 dots horizontal by 2048 lines vertical.

3.12.2.2.2.3 Usable Display Area. The TCW display shall have a minimum usable area of 19.6 inches by 19.6 inches.

3.12.2.2.3 TCW Physical Characteristics

3.12.2.2.3.1 Dimensions. The TCW shall be a self contained unit with the maximum outline dimensions which allows installation in the TRACON/RAPCON Modular Console specified in FAA-E-2312a, 6.1.

3.12.2.2.3.2 Viewing Angle. The TCW display viewing angle shall be a fixed pitch between 15 and 24 degrees measured with respect to a vertical plane.

3.12.2.2.3.3 Mobility of TCW

3.12.2.2.3.3.1 Mounting of TCW. The TCW shall be mounted on casters or other means to facilitate movement by no more than two people without support equipment.

3.12.2.2.3.3.2 Turning Radius. Casters or other means to facilitate movement shall provide a swivel capability to minimize the TCW turning radius.

3.12.2.2.3.4 Movement Locking. The TCW shall remain in position by using locking devices on the casters or by other means which do not require facility modification.

3.12.2.2.3.5 TCW Exhaust. The TCW shall exhaust air to the rear and/or top rear of the workstation away from the equipment operator.

3.12.2.2.4 Workspace

3.12.2.2.4.1 Adjustable Shelf. The TCW shelf shall be removable and provide a height adjustment to ensure flush installation with the top of the separator post shelf specified in FAA-E-2312a, SPS-1 and SPS-2.

3.12.2.2.4.2 Writing Space. The TCW shelf shall accommodate one data entry set and provide sufficient space for one 8.5" x 11" pad of paper (standard letter) and one 6" x 9" pad of paper (standard stenographic notebook) without overhanging the shelf.

3.12.2.2.4.3 Writing Surface. The writing surface shall be covered by a replaceable, non-glare, non-slip material.

3.12.2.2.5 TCW Installation. TCW installation shall allow the operation of TCWs up to 500 physical feet from the TRACON equipment room.

3.12.2.3 Monitor and Control Workstation (MCW)

3.12.2.3.1 Data Entry Set. The MCW shall at a minimum contain a keyboard with standard "QWERTY" layout and a pointer device.

3.12.2.3.2 Display Characteristics

3.12.2.3.2.1 Resolution. The MCW display shall have a minimum display resolution of 1280 dots horizontal by 1024 lines vertical.

3.12.2.3.2.2 Usable Display Area. The MCW shall have a minimum usable display area of 14 inches by 11 inches.

3.12.2.3.3 Workspace. The MCW display, data entry devices, and printer shall have provisions to enable mounting in two different ways:(a) desk top (b) mobile unit.

3.12.2.3.4 MCW Installation. MCW installation shall allow the operation of MCWs up to 500 physical feet from the TRACON or Tower equipment room.

3.12.2.4 Tower Display Workstation (TDW)

3.12.2.4.1 Data Entry Devices

3.12.2.4.1.1 Data Entry Set. A data entry set shall contain, at a minimum, an alphanumeric device and a pointer device.

3.12.2.4.1.2 Multiple Data Entry Sets. The TDW shall allow for the interface of up to two data entry sets.

3.12.2.4.1.3 Dimensions. The TDW input devices shall fit on the shelf of a typical tower cab console as presented in FAA Order 6480.7C, Appendix 3, figure 18.

3.12.2.4.2 Display Mounting. The TDW display unit shall have provisions to enable mounting in four different ways: (a) desk top, fixed (b) desk top, swivel (c) ceiling mounting, swivel (d) console mount.

3.12.2.4.3 Display Characteristics

3.12.2.4.3.1 Contrast Ratio. A minimum contrast ratio of 1.7 to 1 shall be maintained at 6,000 foot candles incident.

3.12.2.4.3.2 Resolution. The TDW shall have a minimum display resolution of 1280 dots horizontal by 1024 lines vertical.

3.12.2.4.3.3 Usable Display Area. The TDW shall have a minimum usable display area of 210 square inches.

3.12.2.4.4 Supplemental Display

3.12.2.4.4.1 Supplemental Display Output. The TDW shall have the capability to interface with a supplemental display for the purpose of data entry and tabular data display.

3.12.2.4.4.2 Supplemental Display Characteristics

3.12.2.4.4.2.1 Usable Display Area. The supplemental display shall have a minimum usable display area of 8 inches by 6 inches.

3.12.2.4.5 Collocated Tower TDW Installation. Collocated tower installation shall allow the placement of TDW(s) up to 5000 feet from the TRACON equipment room.

3.12.2.4.6 Display and Data Entry Devices Installation. TDW installation shall allow the placement of display and data entry devices up to 500 feet from the associated TDW's processing equipment.

3.12.2.5 General Purpose Workstation (GPW)

3.12.2.5.1 Data Entry Devices

3.12.2.5.1.1 Data Entry Set. A data entry set shall contain, at a minimum, an alphanumeric device and a pointer device.

3.12.2.5.1.2 Alphanumeric Entry. The alphanumeric data entry device for the GPW shall have the same physical layout as the TCW data entry device.

3.12.2.5.2 Display Characteristics

3.12.2.5.2.1 Resolution. The GPW display shall have a minimum display resolution of 1280 dots horizontal by 1024 lines vertical.

3.12.2.5.2.2 Usable Display Area. The GPW shall have a minimum usable display area of 16 inches by 12 inches.

3.12.2.6 Printers

3.12.2.6.1 ASCII Printer. All printers shall be ASCII capable.

3.12.2.6.2 Page Printer. If a page printing device is provided, it shall be controllable according to the conventions identified in the Adobe Systems PostScript (TM) standard.

3.12.2.6.3 Plotter. A plotter capable of producing E-size color documents shall be supported.

3.12.2.6.4 Printer Notification. All printers shall be capable of supplying a notification for paper refill to the MCP.

3.12.2.7 Independent Time Source Characteristics

3.12.2.7.1 Independent Time Source Accuracy. The independent calibrated national standard time source shall have an accuracy relative to Coordinated Universal Time (UTC) of within 1 msec.

3.12.2.8 Hardware Maintenance

3.12.2.8.1 Accessibility. Equipment layout shall provide clear and unrestricted access for service or replacement of any line replaceable unit (LRU) at any operational or non-operational location.

3.12.2.8.2 Serviceability

3.12.2.8.2.1 Service Access. Equipment layout shall permit ready access to all adjustments, test points, terminals and wiring.

3.12.2.8.2.2 LRU Replacement. Hardware component configurations shall permit LRU replacement without interruption of FSL or ESL.

3.12.3 Software

3.12.3.1 Open Systems Environment

3.12.3.1.1 Data Management Services

3.12.3.1.1.1 Data Dictionary/Directory Implementations. Data dictionary/directory implementations shall comply with FIPS 156, Information Resource Dictionary Systems.

3.12.3.1.1.2 Structured Query Language (SQL) Processors. SQL processors shall comply with FIPS 127-2, Database Language SQL.

3.12.3.1.2 Human/Computer Interface Services. Client-server operations shall comply with FIPS 158-1.

3.12.3.1.3 Network Services. Computer network services shall comply with FIPS 146-2, Profiles for Open Systems Internetworking Technologies (POSIT).

3.12.3.1.4 Operating System Services. Operating system environments for kernel operations shall implement FIPS 151-2.

3.12.3.1.5 Software Engineering Services

3.12.3.1.5.1 Application Software Implementation Language. All automation application software shall implement a higher order language (HOL) which complies with the FIPS standards as specified below.

3.12.3.1.5.2 C Language. C language processors shall comply with FIPS 160C.

3.12.3.1.5.3 Ada Language. Ada language processors shall comply with FIPS 119 Ada.

3.12.3.1.5.4 Modification of Application Software. All modifications or additions to automation application software shall be written in the HOL that is predominant in the majority of the existing automation application software code.

3.12.3.2 Commercially Available Software (CAS)

3.12.3.2.1 Unmodified CAS. CAS shall be used without modification to the source code.

3.12.3.2.2 Tailoring Documentation

3.12.3.2.2.1 Entry Methods. The method of entry for all parameters used to configure a CAS component shall be documented.

3.12.3.2.2.2 Parameters Defined. The usage of all parameters for configuring a CAS component shall be documented.

3.12.3.2.2.3 Acceptable Values. The acceptable values for all parameters used to configure a CAS component shall be documented.

3.12.3.3 Utility Software Implementation Languages. All newly developed utilities, tools and diagnostics shall be developed in the same higher order language(s) as the automation application software.

3.12.4 Firmware

3.12.4.1 Application Firmware. Any non-volatile storage device used for STARS application code storage shall be reprogrammable.

3.12.4.2 Reprogramming. Reprogramming of non-volatile storage devices used for STARS application code storage shall be accomplished without the removal of the device.

3.12.5 Electrical

3.12.5.1 Electrical Wiring. Electrical wiring used in the system shall be in accordance with FAA-G-2100F, 3.1.2.1.

3.12.5.2 Alternating Current (AC) Supply Line - Circuits and Parts. All AC supply line circuits and parts shall be in accordance with FAA-G-2100F, 3.1.2.2 and its associated subsections.

3.12.5.3 Circuit Protection. All system circuit protection shall be in accordance with FAA-G-2100F, 3.1.2.3.

3.12.5.4 Power Source. All system power sources shall be in accordance with FAA-G-2100F, 3.1.2.4 and its associated subsections.

3.12.5.5 Grounding, Bonding, Shielding, and Transient Protection. Lightning protection, grounding, bonding, shielding, transient protection, and personnel protection shall be in accordance with FAA-G-2100F, 3.1.2.7.1.

3.12.5.6 Voltage. Primary power for equipment shall be facility input power of 120VAC with voltage and frequency ranges as specified in FAA-G-2100F, 3.2.1.3, Table IV.

3.12.5.7 Impact on Operations. When operating in accordance with the requirements of this specification, the STARS system shall have no degrading effect on operation of other systems in the facility.

3.12.5.8 Electromagnetic Interference (EMI). All electrical equipment shall be in accordance with Federal Communications Commission 47CFR Part 15, Class A.

3.12.6 Mechanical

3.12.6.1 Connectors and Fasteners

3.12.6.1.1 Cable Support. Supports shall be provided to keep cables organized, relieve stress, and prevent sagging.

3.12.6.1.2 Electrical Connectors. All electrical connectors shall conform to ANSI/EIA standards.

3.12.6.1.3 Fasteners. Fastener hardware shall conform to ANSI/EIA standards.

3.12.6.2 Enclosures

3.12.6.2.1 Equipment Mounting. All equipment, except workstation related equipment, shall be mounted in enclosures which conform to ANSI/EIA 310-D.

3.12.6.2.2 Equipment Access. Front and rear access shall be provided for all enclosures.

3.12.6.2.3 Cable Access. Enclosures shall allow for cable access either above floor at the top of the enclosure, or below floor, internal to the enclosure.

3.12.6.2.4 Finish. All equipment shall be in accordance with FAA-G-2100F, 3.3.1.2.6 and its associated subsections.

3.12.6.3 Space

3.12.6.3.1 TRACON Equipment Room. While operating at maximum stress workload, the physical footprint of the STARS equipment installed in the TRACON equipment room, excluding workstations and printers, shall be no more than 250 square feet including front and rear access to equipment enclosures.

3.12.6.3.2 Tower Equipment Room. The physical footprint of the STARS equipment installed in a tower equipment room, excluding workstations and printers, shall be no more than 25 square feet including front and rear access to equipment enclosures.

3.12.6.3.3 Storage Space. No unique storage space shall be required by the STARS automation subsystem.

3.12.6.4 Structural Integrity

3.12.6.4.1 Structural Independence. The structural strength and rigidity of the equipment shall be independent of any strength and rigidity furnished by access doors.

3.12.6.4.2 Structural Strength. Structural strength and rigidity of the equipment shall be such that normal handling in loading, shipping, unloading, and setting into position for installation, including normal operational and non-operational installation, will not result in any permanent set or deformation sufficient to impair the appearance or operation of the equipment nor to interfere with ease of maintenance, removal of units or components, ventilation, and operation of access doors.

3.12.6.5 Weight

3.12.6.5.1 Floor Loading. The floor loading conditions for each completed enclosure, cabinet, rack, workstation, and any supporting maintenance devices shall be up to 125 pounds per square foot.

3.12.6.5.2 Maximum Component Weight. No removable component shall exceed the weight lifting requirements of FAA-G-2100F, 3.3.7.3, for male and female handling, unless the system provides mechanical devices for all necessary handling.

3.12.6.5.3 Total TCW Weight. The completed TCW maximum weight shall be less than or equal to 750 pounds.

3.12.6.5.4 TDW Display Weight. The TDW display weight shall be less than or equal to 100 pounds.

3.13 Personnel-Related Requirements

3.13.1 Computer Human Interface (CHI)

3.13.1.1 General

3.13.1.1.1 Applicability. All the requirements stated in 3.13.1.1 through 3.13.1.3 shall apply to the CHI for all STARS operational users, including monitor and control operators.

3.13.1.1.2 Same CHI For Local and Remote ATC Workstations. All local and remote tower ATC operational data entry and display functions shall have the same CHI as that of the TRACON TCW.

3.13.1.2 Data Entry

3.13.1.2.1 General

3.13.1.2.1.1 Propagate Data Changes To All Views. Any update to a data field shall be propagated by the system to all affected views.

3.13.1.2.1.2 Feedback Messages. Feedback shall be provided in response to all keystrokes and other data entry actions.

3.13.1.2.1.3 Unlimited Time For Entry Of ATC Commands. Operator input from a TCP shall continue to be displayed until there is a TCP action which causes its activation or removal.

3.13.1.2.1.4 Upper and Lower Cases Equivalent. Upper and lower case input shall be accepted as equivalent.

3.13.1.2.1.5 Complete Command From A Single Device. For each command, a method of entry shall be provided which allows the operator to complete the entire command from a single input device.

3.13.1.2.2 Preview Commands

3.13.1.2.2.1 Operator Confirmation Of Manually Entered Data. Manually entered data shall be displayed for operator confirmation prior to system acceptance and processing.

3.13.1.2.2.2 Capability To Clear A Command. A command which is under composition shall be clearable by the operator.

3.13.1.2.2.3 Modify Command Under Composition. A command which is under composition shall be modifiable by the operator.

3.13.1.2.2.4 Automatically Clear Data Entry Feedback. Data entry feedback for a command shall be cleared automatically when the command is accepted.

3.13.1.2.2.5 Function Key Without Clear Command. Execution of a function key shall result in the automatic clearing of any command under composition.

3.13.1.2.3 Input Devices

3.13.1.2.3.1 Pointer Device

3.13.1.2.3.1.1 Purpose. A pointer device shall be used as a cursor control.

3.13.1.2.3.1.2 Method For Selection. The pointer device shall provide a method for selection of one or more displayed objects as command parameters.

3.13.1.2.3.1.3 Method for Selection and Entry. The pointer device shall provide a method for simultaneous selection of a parameter and execution of a command.

3.13.1.2.3.1.4 Feedback Of Pointer Device. When the cursor rests on an object for an adaptable period, feedback shall be provided to indicate which object would be selected if the pointer device was used to select a parameter or execute a command.

3.13.1.2.3.1.5 Cursor Speed. Control algorithms governing the relationship between the movement of the cursor and the manipulation of the pointer device shall be operator-selectable and proportional to device movement.

3.13.1.2.3.1.6 Relocation Of Cursor To Adaptable Location. A command shall be available which causes the cursor to relocate to an adapted location on the display.

3.13.1.2.3.1.7 Cursor Direction. The cursor which is associated with the pointer device shall move in the same direction as the pointer device.

3.13.1.2.3.1.8 Left Or Right Handed. The pointer device shall be equally usable with the left or the right hand.

3.13.1.2.3.2 Alphanumeric Device

3.13.1.2.3.2.1 Simultaneous Keypress. Command/control entries from a TCP shall not require the operator to depress two or more keys simultaneously.

3.13.1.2.3.2.2 Feedback. Tactile or audible feedback shall be provided in response to all inputs.

3.13.1.2.3.3 Numeric Pad

3.13.1.2.3.3.1 Physically Separated. A set of numeric keys shall be separate from the alphanumeric keys and arranged in accordance with MIL-STD 1472D, 5.4.3.1.3.2.

3.13.1.2.3.3.2 Enter Key. An Initiate Function device shall be located in a position that allows a fifth percentile female to use the numeric pad and activate the Initiate Function device without moving her hand.

3.13.1.2.3.4 Function Keys

3.13.1.2.3.4.1 Hard Function Keys. Function keys which are programmable through adaptation shall be labeled.

3.13.1.2.3.4.2 Soft Function Keys. Function keys which are programmable by the operator shall display a label to indicate the key's current function.

3.13.1.3 Display Output

3.13.1.3.1 General

3.13.1.3.1.1 Usability Of Data. Data shall be presented in a form that can be used immediately, with no further calculations, extrapolation, or references to extraneous sources.

3.13.1.3.1.2 Insufficient Space Indication. An indication shall be provided to the operator whenever information is not displayed due to insufficient space in a view.

3.13.1.3.1.3 Text Presentation. Text shall be presented in upper case, lower case, or mixed case.

3.13.1.3.1.4 Continuous Text. Text which is presented in sentence or paragraph format shall be presented in mixed upper and lower case.

3.13.1.3.1.5 View Suppression. When a view is suppressed, it shall be represented by a unique identifier.

3.13.1.3.1.6 Resizing Radar Data Views. No change to character or symbol size shall result from resizing a radar data presentation view, whether the resizing is automatic or manually initiated.

3.13.1.3.1.7 Resizing Other Views. Resizing a view other than a radar data presentation view shall result in proportional change to character and symbol size, whether the resizing is automatic or manually initiated

3.13.1.3.2 Alphanumeric List Data

3.13.1.3.2.1 List Left-Justified And Vertical. The first character of each list item shall be left justified and aligned vertically.

3.13.1.3.2.2 Each Item New Line. Each item in a list shall start on a new line.

3.13.1.3.2.3 Group Separators. Blank areas shall be used to separate logical groups of information.

3.13.1.3.2.4 Position Indication. For data which may be paged or scrolled, an indication of the current position shall be displayed at all times.

3.13.1.3.3 Labels

3.13.1.3.3.1 Views. Every view shall have a unique identifier.

3.13.1.3.3.2 Pages. In multiple page views, each page shall be fully labeled.

3.13.1.3.4 Emphasis

3.13.1.3.4.1 Information Coding. Information coding techniques shall be used to discriminate among different classes of data.

3.13.1.3.4.2 Consistent Coding Conventions. Information coding conventions shall be consistently applied.

3.13.1.3.4.3 Redundant Coding. Redundant coding techniques shall be used for all alert and cautionary information.

3.13.1.3.4.4 Color Coding. A single adaptable color coding scheme shall be applied to all views.

3.13.1.3.4.5 Geographic Map Symbol Coding

3.13.1.3.4.5.1 Shape Codes. A geometric shape code shall have a consistent meaning for all information displayed at TCPs.

3.13.1.3.4.5.2 Size. The minimum symbol size shall be 0.12 inches (0.38 degree at a distance of 18 inches).

3.13.1.3.4.6 Auditory Coding

3.13.1.3.4.6.1 Redundant. When auditory signals are used, redundant visual display information shall also be presented.

3.13.1.3.4.6.2 Volume Adjust. The volume of an auditory alarm shall be manually and continuously adjustable between an adaptable minimum level and a maximum level.

3.13.1.3.4.6.3 Signal Consistency. The same auditory signal shall always indicate the same information.

3.13.1.3.4.6.4 Duration. Auditory alerts shall have an adaptable duration of at least 0.5 seconds.

3.13.1.3.4.6.5 Signal Meaning. Each auditory signal shall have a unique meaning.

3.13.1.3.4.6.6 Frequency Of Auditory Signals. The frequency of all auditory signals shall be adaptable between 400 and 3000 Hz.

3.13.1.3.4.6.7 Modulation of Auditory Signal. Modulation of auditory alerts shall be adaptable from one to eight cycles per second.

3.13.1.3.4.6.8 Auditory Alert Volume. Auditory alert volumes shall be in accordance with FAA-G-2100F, Section 3.3.6.5.5.1.

3.13.1.3.4.7 Blink Coding

3.13.1.3.4.7.1 Purpose. The use of blinking or flashing shall be limited to search and identification tasks and to draw attention to time-critical events.

3.13.1.3.4.7.2 Blink or Flash Period. Data which is blinking or flashing shall have an "on" period which is at least as long as the "off" period.

3.13.1.3.4.7.3 Adaptable Rate. Blink or flash rates shall be adaptable.

3.13.1.3.4.7.4 Remove Blink With Acknowledgement. Blinking or flashing emphasis shall be terminated as a function of acknowledgment.

3.13.1.3.4.8 Brightness Coding. Brightness coding for data items shall be adaptable.

3.13.1.3.4.9 Size Coding

3.13.1.3.4.9.1 Two Sizes. When size coding is used to discriminate between symbols, it shall be limited to two different sizes per symbol.

3.13.1.3.4.9.2 Adaptable. When size coding is used, the sizes shall be adaptable.

3.13.1.3.5 Menus

3.13.1.3.5.1 Unavailable Menu Option. Temporary unavailability of a menu option shall be indicated through information coding.

3.13.1.3.5.2 Adaptable Order. The order of menu items shall be adaptable.

3.13.1.4 Monitor and Control

3.13.1.4.1 General

3.13.1.4.1.1 Applicable. The requirements in 3.13.1.4 shall be applicable to the MCP only.

3.13.1.4.1.2 Adaptable Time Limits For MCP Input. Adaptable time limits or time-outs shall be available for MCP inputs.

3.13.1.4.2 Data Entry

3.13.1.4.2.1 Command Multiple Resources With Single MCP Input Action. The CHI shall provide a capability to command multiple resources with a single command.

3.13.1.4.2.2 Data Destruction. A statement of the consequences of a destructive command/control action shall be presented to the operator prior to command/control execution.

3.13.1.4.2.3 Positive Confirmation Prior To Data Destruction. A positive confirmation shall be obtained from the operator before executing a command/control action which results in destruction of data.

3.13.1.4.2.4 Confirmation Inputs Set In Adaptation. MCP inputs which are to require confirmation from the operator shall be set in adaptation.

3.13.1.4.2.5 Reset Existing Aural And Visual Alarms. Active auditory and visual alarms shall be resettable with a single action.

3.13.1.4.2.6 Reset Aural Alarm Independently. An active auditory alarm shall be resettable independently from an associated visual alert.

3.13.1.4.2.7 Context-Sensitive Menus. Based on pointer device selection, a set of context-sensitive menus shall be displayed.

3.13.1.4.3 Display Output

3.13.1.4.3.1 Views. All M&C data shall be presented in the form of movable, resizeable, opaque views.

3.13.1.4.3.2 Simultaneous Views. Views shall be displayable simultaneously with no restrictions as to view type or location.

3.14 Training (Not Applicable)

3.15 Logistics-Related Requirements (Not Applicable)

3.16 Additional Requirements

3.16.1 Installation and Transition

3.16.1.1 Operational Impact

3.16.1.1.1 Service Interruption Limitation. Service interruptions shall be limited to initial site hook-up of transition equipment cables to existing equipment where no dual/spare output or input connection is available.

3.16.1.1.2 No Service Interruption . No service interruption shall result from transition between STARS equipment and current automation equipment.

3.16.1.1.3 No Interference With Existing Operations. Transition equipment shall not interfere with facility ATC operations.

3.16.1.1.4 No Impact To Current Configuration. All transition equipment shall operate without changes to the current automation system hardware and software.

3.16.1.2 Transition Equipment RMA

3.16.1.2.1 MTTR. Transition equipment shall have a mean time to repair of thirty minutes.

3.16.1.2.2 MTBF. Transition equipment shall have a mean time between failures of 10,000 hours.

3.16.1.3 Transient Equipment. Any transient equipment required during installation and transition shall meet the requirements specified in the following sections:

3.7, Safety;
3.9, System Environment;
3.12.2.8.2, Serviceability;
3.12.5, Electrical;
3.12.6.1, Connectors and Fasteners;
3.12.6.4, Structural Integrity;
3.12.6.5, Weight.

3.16.2 Preplanned Product Improvement (P3I)

3.16.2.1 Interfaces

3.16.2.1.1 One-way Interface

3.16.2.1.1.1 General. A one-way interface shall supply data to external systems.

3.16.2.1.1.2 Use of the AIG. The one-way interface external physical path shall be provided by the AIG.

3.16.2.1.1.3 Local Area Network (LAN). The one-way interface external physical path shall be implemented in accordance with a vendor selected, standard commercial LAN media.

3.16.2.1.1.4 Multicast. Data output by STARS to the one-way interface shall be transmitted with a multicast link layer address.

3.16.2.1.1.5 Data. Track and flight data information shall be transmitted on the one-way interface.

3.16.2.1.1.6 One-Way Interface Characteristics. The one-way interface physical media, commmunication protocols and message formats shall be implemented in accordance with a vendor defined ICD.

3.16.2.1.2 Two-way Interface

3.16.2.1.2.1 General. Two-way interfaces shall supply data to and receive data from external systems.

3.16.2.1.2.2 Interface Redundancy. A separate primary and backup communications path shall be implemented for each two-way interface.

3.16.2.1.2.3 Use of the AIG. Two-way interfaces shall be established via the AIG.

3.16.2.1.2.4 AIG Interfaces Characteristics. Each two-way interface shall be implemented in accordance with an ICD.

3.16.2.1.2.5 Fault Tolerance

3.16.2.1.2.5.1 Automatic Failure Detection. Failure of a two-way interface shall be detected automatically.

3.16.2.1.2.5.2 Automatic Reconfiguration. Failure of a two-way interface shall initiate automatic reconfiguration to the backup path.

3.16.2.1.2.6 Two-way Interface Security. Two-way interfaces shall employ security features in accordance with Section 3.2.2.8.3.3, External Systems.

3.16.2.2 Specific P3I Capability Upgrades

3.16.2.2.1 Surveillance System Enhancements

3.16.2.2.1.1 Alternate Surveillance Message Formats

3.16.2.2.1.1.1 ASTERIX. STARS shall accept and process surveillance message data in accordance with EUROCONTROL ASTERIX standards.

3.16.2.2.1.1.2 Other Surveillance Message Formats. STARS shall accept and process surveillance message data in other formats as specified in IRDs to be supplied by the Government.

3.16.2.2.1.2 Automatic Dependent Surveillance (ADS)

3.16.2.2.1.2.1 ADS Processing. STARS shall accept and process ADS position reports.

3.16.2.2.1.2.2 ADS-Broadcast (ADS-B) Interface. The interface between ADS-B ground equipment and STARS shall be in accordance with an IRD to be provided by the Government.

3.16.2.2.1.3 Surveillance Processing Enhancements

3.16.2.2.1.3.1 Use of Increased Precision. When an implemented alternate surveillance message format provides increased precision of position reporting, STARS shall utilize the increased precision to improve tracking performance.

3.16.2.2.1.3.2 Use of Surveillance File Numbers. When an implemented alternate message format provides file numbers correlating targets to tracks, STARS shall use these numbers to enhance tracking performance.

3.16.2.2.1.3.3 Tracking Enhancements

3.16.2.2.1.3.3.1 Data Fusion. Tracking enhancements shall combine all target reports from connected surveillance systems to form single, integrated aircraft tracks.

3.16.2.2.1.3.3.2 System Weighting. Tracking enhancements shall weight surveillance system inputs based on surveillance system accuracy in the formation of target tracks.

3.16.2.2.1.3.3.3 Exclusion of Sensors. Tracking enhancements shall exclude inputs from sensors in an off-line state for track formation purposes.

3.16.2.2.1.3.3.4 Time Utilization. Tracking enhancements shall use the time stamp information for report time correlation when available.

3.16.2.2.1.3.4 Automatic Barometric Pressure Updating

3.16.2.2.1.3.4.1 Digital Altimeter Setting Indicator (DASI) Interface. STARS shall interface with up to 40 airport DASI systems in accordance with an IRD to be provided by the Government.

3.16.2.2.1.3.4.2 DASI Data Functions. STARS shall automatically update barometric pressure data used in Mode-C altitude correction algorithms from interfaced DASI systems.

3.16.2.2.1.3.4.3 DASI Data Display. STARS shall display DASI data.

3.16.2.2.2 Surface Separation

3.16.2.2.2.1 Airport Movement Area Safety System (AMASS). STARS shall interface to the AMASS in accordance with one-way interface requirements.

3.16.2.2.2.2 Airport Surface Traffic Automation (ASTA)

3.16.2.2.2.2.1 ASTA Interface. STARS shall interface to the ASTA in accordance with two-way interface requirements.

3.16.2.2.2.2.2 ASTA Messages. The ASTA interface shall support messages in accordance with an IRD to be supplied by the Government.

3.16.2.2.2.2.3 ASTA Functions. STARS shall perform ASTA support functional processing in accordance with functional specifications to be supplied by the Government.

3.16.2.2.3 Improved Weather Display

3.16.2.2.3.1 Integrated Terminal Weather System (ITWS)

3.16.2.2.3.1.1 ITWS Interface. STARS shall interface to ITWS in accordance with two-way interface requirements.

3.16.2.2.3.1.2 ITWS Messages. The ITWS interface shall support weather messages in accordance with an IRD to be supplied by the Government.

3.16.2.2.3.1.3 ITWS Functions. STARS shall perform ITWS support functional processing in accordance with functional specifications to be supplied by the Government.

3.16.2.2.3.2 ASR-9 Wind Shear Processor

3.16.2.2.3.2.1 ASR-9 Wind Shear Processor Interface. STARS shall interface to the ASR-9 Wind Shear Processor in accordance with an IRD to be provided by the Government.

3.16.2.2.3.2.2 ASR-9 Wind Shear Processor Data Functions. STARS shall process and display ASR-9 Wind Shear Processor data in accordance with functional specifications to be provided by the Government.

3.16.2.2.3.3 Terminal Doppler Weather Radar (TDWR)

3.16.2.2.3.3.1 TDWR Interface. STARS shall interface to the TDWR in accordance with an IRD to be supplied by the Government.

3.16.2.2.3.3.2 TDWR Data Functions. STARS shall process and display TDWR data in accordance with functional specifications to be supplied by the Government.

3.16.2.2.4 Data Link Communications

3.16.2.2.4.1 Data Link Interface. STARS shall interface to Data Link in accordance with two-way interface requirements.

3.16.2.2.4.2 Data Link Messages. The Data Link interface shall support messages in accordance with an IRD to be supplied by the Government.

3.16.2.2.4.3 Data Link Functions. STARS shall perform Data Link support functional processing in accordance with functional specifications to be supplied by the Government.

3.16.2.2.5 Separation Assurance Enhancements

3.16.2.2.5.1 Precision Runway Monitor (PRM) Interface. STARS shall accept track data from PRM electronic scanning beacon radar subsystems.

3.16.2.2.5.2 PRM Interface Control Document. The PRM surveillance data interface shall be in accordance with an ICD to be supplied by the Government.

3.16.2.2.5.3 PRM Surveillance Data Functions

3.16.2.2.5.3.1 PRM Data Functions. STARS shall process and display PRM track data in accordance with the FMA requirements of this specification.

3.16.2.2.5.3.2 PRM Data Latency. STARS shall display target reports received from the PRM beacon radar subsystem within 0.25 seconds of target report receipt.

3.16.2.2.5.3.3 PRM Surveillance Update Interval. STARS shall support variable PRM update rates within a minimum of 0.5 seconds.

3.16.2.2.5.3.4 PRM Load. STARS shall meet the PRM update rate latency requirements under a load of 50 airborne tracks from each PRM beacon radar subsystem.

3.16.2.2.6 Conflict Alert (CA) and Mode-C Intruder (MCI) Alert Enhancements

3.16.2.2.6.1 CA and MCI Probability of Detection. CA and MCI algorithms shall be enhanced to improve the probability of detection of aircraft conflicts.

3.16.2.2.6.2 CA and MCI False Alarms. CA and MCI algorithms shall be enhanced to reduce the probability of false alarms.

3.16.2.2.6.3 CA and MCI Use of Multisensor Tracking Features. CA and MCI algorithms shall be enhanced to employ the multisensor tracking features of the surveillance system enhancements.

3.16.2.2.7 Terminal ATC Automation (TATCA)

3.16.2.2.7.1 Center-TRACON Automation System (CTAS) Interface. STARS shall interface to CTAS in accordance with two-way interface requirements.

3.16.2.2.7.2 CTAS Messages. The CTAS interface shall support messages in accordance with an IRD to be supplied by the Government.

3.16.2.2.7.3 CTAS Functions. STARS shall perform CTAS support functional processing in accordance with functional specifications to be supplied by the Government.

3.16.2.2.8 Traffic Management Enhancements

3.16.2.2.8.1 Traffic Management Enhancements Interface. STARS shall interface to Traffic Management Enhancements in accordance with two-way interface requirements.

3.16.2.2.8.2 Traffic Management Enhancements Messages. The Traffic Management Enhancements interface shall support messages in accordance with an IRD to be supplied by the Government.

3.16.2.2.8.3 Traffic Management Enhancements Functions. STARS shall perform Traffic Management Enhancements support functional processing in accordance with functional specifications to be supplied by the Government.

3.16.2.2.9 Supplemental Flight Data Processing

3.16.2.2.9.1 Flight Data Input/Output (FDIO)

3.16.2.2.9.1.1 Replacement Alphanumeric Keyboard (RANK) Functions. FDIO RANK functions shall be performed at the TCW.

3.16.2.2.9.1.2 Cathode Ray Tube (CRT) Functions. FDIO CRT functions shall be provided at the TCW.

3.16.2.2.9.1.3 Replacement Flight Strip Printer (RFSP) Functions. STARS equipment shall perform the functions of the FDIO RFSP.

3.16.2.2.9.1.4 FDIO Interface. The interface to the Central Control Unit (CCU) of the FDIO system shall meet the characteristics specified in the Flight Data Input/Output Program Software Interface Control Document (NAS-MD-581).

3.16.2.2.9.2 Flight Data Processing (FDP)

3.16.2.2.9.2.1 General. FDP functions shall be in accordance with a functional specification to be provided by the Government.

3.16.2.2.9.2.2 Electronic Flight Data. Electronic display and manipulation of flight data shall be in accordance with functional specifications to be provided by the Government.

3.16.2.2.9.3 STARS/STARS Interfacility Interfaces

3.16.2.2.9.3.1 Number of STARS/STARS Interfacility Interfaces. The STARS/STARS interfacility interface shall exchange data directly with up to seven other STARS facilities.

3.16.2.2.9.3.2 STARS/STARS Interfacility Interface Characteristics. The STARS/STARS interfacility interface shall be in accordance with a vendor defined ICD.

3.16.2.2.9.3.3 STARS/STARS Interfacility Interface Messages. The STARS/STARS interfacility interface messages shall be in accordance with the Terminal/En Route Interfacility ICD, NAS-IC-21058217.

3.16.2.2.10 Free-Form Text. TCP-defined areas for free-form text, to be used for temporary information, shall be provided on the TCWs.

3.16.2.2.11 TCP-Defined Airspace. TCP-defined airspace shall be displayed on the TCWs.

3.17 Packaging Requirements (Not Applicable)

3.18 Precedence and Criticality of Requirements (Not Applicable)

4 QUALIFICATION PROVISIONS

4.1 Quality Assurance

4.1.1 ISO Standards. The STARS shall be developed and produced in accordance with Quality Assurance (QA) provisions as defined in Quality Management and Quality Assurance Standards: ISO 9001 and ISO 9000-3.

4.1.2 Completeness. The quality assurance provisions shall ensure that engineering design and development are complete, that design risks are minimized, and that all delivered hardware, software, and documentation meet specified requirements.

4.1.3 Detection of Deficiencies. The quality assurance provisions shall also ensure that the methods of design, construction, inspection, and testing provide early detection of deficiencies and assure prompt, effective corrective action.

4.2 Test Program

4.2.1 Test Strategy. The test program shall verify that the STARS is in compliance with all applicable requirements contained in Section 3 of this specification.

4.2.2 Traceability. Every requirement in Section 3 of this specification shall be allocated to at least one test.

4.2.3 Test Conduct

4.2.3.1 Success Criteria. Each test shall have success criteria.

4.2.3.2 Pass/Fail. Each test shall be conducted on a pass/fail basis.

4.2.3.3 Pass/Fail Criteria. The pass/fail criteria shall provide a clear and unambiguous objective for the determination of test success or failure.

4.2.3.4 Test Completeness. A test shall be considered complete when the test has been executed without aborts or errors (unless they are part of the test procedure) and when all analyses have verified correct operation and compliance with all applicable requirements.

4.2.3.5 Test Repeatability. Each test shall be capable of being repeated and achieve the same results.

4.2.3.6 Discrepancies. Discrepancies between actual and expected test results shall be explained by analysis of test data.

4.2.4 Test Methods

4.2.4.1 Applicability. The verification methods identified herein shall be applicable to all requirements identified in this specification as assigned in the VRTM contained in Section 40.

4.2.4.2 Inspection. Inspection shall be defined as the visual examination of system components, documentation, etc.

4.2.4.3 Analysis. Analysis shall be defined as the processing of accumulated data obtained from other qualification methods. Examples are reduction, interpolation, or extrapolation of test results.

4.2.4.4 Demonstration. Demonstration shall be defined as the operation of the system, or a part of the system, that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis.

4.2.4.5 Test. Test shall be defined as the operation of the system, or a part of the system, using instrumentation or other special test equipment to collect data for later analysis.

4.2.5 Program Technical Reports (PTR)

4.2.5.1 PTR Objective. Each PTR shall describe a single hardware or software anomaly.

4.2.5.2 PTR Classifications

4.2.5.2.1 Type I - Critical - Mission Performance. A Type I problem shall describe a STARS problem that affects the performance of a critical function of the operational ATC system or results in a degradation of STARS RMA requirements.

4.2.5.2.2 Type II - Critical - Support System Performance. A Type II problem shall describe a STARS problem that does not preclude the primary mission objective of controlling aircraft but has unsatisfactory impact on key support functions.

4.2.5.2.3 Type III - Non-Critical. A Type III problem shall describe a STARS non-critical operational function or a non-operational system function or support capability of the STARS.

4.3 Test Requirements

4.3.1 Applicability. The test requirements described herein shall apply to all requirements in Section 3 of this specification.

4.3.2 Installation and Integration

4.3.2.1 Installation. Installation tests shall verify that the installed hardware is functioning correctly to begin integration testing.

4.3.2.2 Installation Tests. Installation tests shall include the following:
a. Tests that verify that the hardware components are integrated into a functional system.
b. Tests that exercise all data paths and Input/Output (I/O) channel paths and exercise all units in the full hardware complement.

4.3.2.3 Integration Testing. Tests shall verify that the newly installed STARS equipment is correctly integrated with the Government Furnished equipment in accordance with the associated Interface Control Documents (ICDs) Interface Requirements Documents (IRDs) Sections 3.3, System External Interfaces, and 3.4, System Internal Interfaces of this specification and including any applicable transition devices.

4.3.3 Scenarios

4.3.3.1 Test Scenario. Test scenarios shall contain chronological sequences of all events and conditions required for the conduct of a particular test.

4.3.3.2 Background Scenario

4.3.3.2.1 Purpose. A Background Scenario shall provide an operationally realistic system background while test cases are executed.

4.3.3.2.2 Characteristics. The Background Scenario shall have the following minimum characteristics:

a. Minimum of four (4) hours duration
b. Surveillance and track data distributed across all airspace sectors throughout the scenario
c. Associated and unassociated tracks throughout the scenario; between 90% and 95% of the tracks shall be beacon tracks, the remainder shall be search radar report tracks. Between 80% and 85% of the beacon tracks shall be discrete
d. Arrival and departure tracks distributed within terminal altitude ranges and terminal speed ranges throughout the scenario
e. Flight paths that generate Conflict Alerts and Minimum Safe Altitude Warning (MSAW) alerts a a minimum frequency of one (1) each per two (2) minutes
f. Average workload (including targets, tracks, and input actions) of the Background Scenario shall be between 30% and 35% of the maximum stress workload specified in the STARS Specification
g. At any given time, the minimum workload shall be no less than 20% of the maximum stress workload specified in the STARS Specification
h. Weather data for a minimum of 75% of the scenario duration

4.3.3.3 Maximum Stress Workload Scenario

4.3.3.3.1 Purpose. A Workload Scenario shall provide a maximum stress system environment for the execution of workload tests.

4.3.3.3.2 Workload Scenario Length. The maximum stress workload scenario shall run for a maximum period of three (3) hours.

4.3.3.3.3 Concurrent Workload. The workload requirements listed in Section 20, Tables 15 through 21 shall be generated simultaneously the maximum stress workload scenario.

4.3.3.3.4 Steady-State Period. The maximum stress workload defined in Section 20, Tables 15 through 21, shall be sustained for a period of at least one hour.

4.3.3.3.5 TCW Workload. The maximum stress workload scenario shall provide a workload in accordance with Section 20, Table 23 during the entire steady-state period for at least one ATC TCW.

4.3.3.3.6 Distributed Load. The load imposed by the scenario shall be distributed over all of the physical and simulated control positions used in the test through out the steady-state period of the maximum stress workload test.

4.3.3.3.7 System Configuration. The maximum stress workload test shall be conducted using a system configuration with a mix of actual and simulated ATC TCWs and MCWs.

4.3.4 Development Test and Evaluation (DT&E)

4.3.4.1 DT&E Components. DT&E shall consist of the following tests:

a. FAA Technical Center Installation and Integration
b. Non-Operational Test
c. FAA Technical Center System Acceptance Test
d. Key Site System Acceptance Test

4.3.4.2 FAA Technical Center Installation and Integration. The installation and integration tests specified in Section 4.3.2, Installation and Integration Test, shall have been successfully completed for STARS prior to the conduct of any tests specified in this section.

4.3.4.3 Non-Operational Test

4.3.4.3.1 Purpose. Tests shall be executed one (1) time to verify the non-operational requirements specified below.

4.3.4.3.2 Safety. Safety requirements of Section 3.7 shall be verified.

4.3.4.3.3 System Environment. System Environments requirements of Section 3.9 shall be verified.

4.3.4.3.4 Reliability. Reliability requirements of Section 3.11, System Quality Factors, shall be verified for the 1st site.

4.3.4.3.5 Maintainability. Maintainability requirements shall be verified in accordance with Section 3.11.2.

4.3.4.3.6 Design and Construction. Design and Construction requirements shall be verified in accordance with Section 3.12.

4.3.4.4 FAA Technical Center System Acceptance Test

4.3.4.4.1 General Test Conditions

4.3.4.4.1.1 Test Configuration. Each test shall be conducted in a hardware and software configuration equivalent to an operational field site.

4.3.4.4.1.2 Data Recording. The system data recording capabilities, in accordance with 3.2.2.5 Data Recording, shall be utilized where necessary to verify the requirements.

4.3.4.4.1.3 Data Analysis. Post-test data analysis shall include the Data Reduction and Analysis (DR&A) in accordance with 3.2.3.3 where necessary to verify the requirements.

4.3.4.4.1.4 System Operations Functions. System operations functions shall be executing in the background.

4.3.4.4.2 Functional Tests

4.3.4.4.2.1 Scope. All functional tests shall be verified with their corresponding performance requirements.

4.3.4.4.2.2 Service Levels. Service Levels requirements of Section 3.1 shall verify Full Service and Emergency Levels, and recovery and transition between these levels.

4.3.4.4.2.3 Computer Human Interface Testing. Computer Human Interface (CHI) requirements in Section 3.13.1 shall be tested in conjunction with DT&E Functional Tests.

4.3.4.4.2.4 Air Traffic Control Operational Functions

4.3.4.4.2.4.1 Purpose. These tests shall be conducted to verify the correct operation and performance of the system functions pertaining to Air Traffic Control (ATC) as specified in Section 3.2.1.

4.3.4.4.2.4.2 Simulated and Real-Time Inputs. The tests shall be conducted using simulated inputs (to track aircraft, to transmit/receive real-time interfacility messages, and to transmit/receive real-time data on other interfaces) and real-time inputs from an actual radar site.

4.3.4.4.2.4.3 Concurrent Testing. At least two TCPs shall be operated concurrently.

4.3.4.4.2.4.4 System Response. Each input shall result in the correct operational system response (e.g., file update, display filtering, display update, message output, error message, response time).

4.3.4.4.2.4.5 Input Verification. Testing of input functions shall verify that all required display capabilities have been correctly and accurately implemented.

4.3.4.4.2.4.6 Input Devices. If the same message may be entered from more than one input device type, then each applicable separate input device type shall be used for the entry of the particular message.

4.3.4.4.2.4.7 Display Verification. Tests of the STARS displays shall verify that all required displays are correctly formatted, contextually valid and accurately represent the required data.

4.3.4.4.2.4.8 Data Verification. Requirements pertaining to data availability, data coding and appropriate data format shall be verified for all displays.

4.3.4.4.2.5 System Operational Functions

4.3.4.4.2.5.1 Purpose. System Operational Function Test shall verify the correct operation and performance requirements in accordance with Section 3.2.2 System Operational Functions.

4.3.4.4.2.5.2 Monitor and Control

4.3.4.4.2.5.2.1 System Status Monitoring. System Status Monitoring requirements of Section 3.2.2.1 shall be verified.

4.3.4.4.2.5.2.2 System Performance Monitoring. System Performance Monitoring requirements of Section 3.2.2.2 shall be verified.

4.3.4.4.2.5.2.3 Fault Insertion. Status monitoring tests shall include fault insertion tests to include tests of all major hardware and software components including faults and errors for each LRU.

4.3.4.4.2.5.2.4 Faults. At a minimum the faults shall include:

a. System integrity faults
b. System restart after a fault
c. Certification fault
d. Performance degradation fault
e. Automatic failure detection fault
f. Failure of the M&C position
g. Interface diagnostic test failure
h. Hardware component failure
i. Software component failure

4.3.4.4.2.5.2.5 System Control. System Control requirements of Section 3.2.2.3 shall be verified.

4.3.4.4.2.5.2.6 Service Certification. Service Certification requirements of Section 3.2.2.4 shall be verified to include the inducement of faults and errors to verify the on-line certification performance on a system with degraded functions.

4.3.4.4.2.5.2.7 Certification Test Condition. Service certification tests shall be conducted while the operational software is executing.

4.3.4.4.2.5.3 Data Recording and Playback. Continuous Data Recording and Workstation Replay requirements of Sections 3.2.2.5 and 3.2.2.6 shall be verified.

4.3.4.4.2.5.4 System Security

4.3.4.4.2.5.4.1 Scope. Security requirements of Section 3.2.2.8 shall be verified.

4.3.4.4.2.5.4.2 Identification and Authentication. Security tests shall verify that there are no known methods of bypassing the identification and authentication mechanisms.

4.3.4.4.2.5.4.3 Access Control. Security tests shall verify for known methods of bypassing security and mission critical data without being defined as a privileged authorized operator.

4.3.4.4.2.5.5 Independent Time Source. Independent time source requirements of Section 3.2.2.9 shall be verified.

4.3.4.4.2.5.6 System Operational Data Entry/Display. System operational data entry and display requirements of Section 3.2.2.10, 3.2.2.11, and 3.2.2.12 shall be verified.

4.3.4.4.2.6 System Support Functions

4.3.4.4.2.6.1 Purpose. System Support Test shall verify the correct operation and performance in Section 3.2.3 System Support Functions.

4.3.4.4.2.6.2 Interfacility Test. Interfacility test function requirements of Section 3.2.3.1 shall be verified.

4.3.4.4.2.6.3 Simulation. Simulation requirements of Section 3.2.3.2 shall be verified.

4.3.4.4.2.6.4 Data Reduction and Analysis (DR&A). Data Reduction and Analysis (DR&A) requirements of Section 3.2.3.3 shall be verified.

4.3.4.4.2.6.5 On-Site System Maintenance. On-Site System Maintenance tests shall include verification of storage of hardware and software diagnostic results, execution of hardware diagnostics, verification of utilities, tools and diagnostic equipment, and verification of software management functions as defined in Section 3.2.3.4.

4.3.4.4.2.6.6 Off-Site System Maintenance. Off-Site System Maintenance tests shall include verification of all requirements in accordance with Section 3.2.3.5 including the STARS Central Support Complex (SCSC) requirements of Section 3.2.3.5.2.2.

4.3.4.4.3 Site Adaptation. Site Adaptation requirements of Section 3.6 shall be verified.

4.3.4.4.4 Training. Training requirements of Section 3.14 shall be verified while the operational software is executing.

4.3.4.4.5 Computer Resource Utilization. Computer Resource requirements of Section 3.10 shall be tested by demonstrating that the measured utilization number are compliant with the specification.

4.3.4.4.6 System Enhancement. Enhanceability shall be tested by verifying that hardware and software can be added without impact to the architecture in accordance with Section 3.12.1.1.

4.3.4.4.7 Scalability. Scalability shall be tested by verifying that the system can be scaled to the full range of configurations.

4.3.4.4.8 Performance Tests

4.3.4.4.8.1 Scope. Performance testing shall verify the system workload requirements, ATC functional algorithms and response time and update rates as specified in Section 3.2.4, System Performance.

4.3.4.4.8.2 Workload

4.3.4.4.8.2.1 Purpose. System workload tests shall verify the ability of STARS to operate in the maximum stress configuration at a maximum stress workload as defined in the system workload tables in Section 20, Tables 15 - 21.

4.3.4.4.8.2.2 Scope. All performance requirements of Section 3.2.4.1 shall be verified using the Maximum Stress Workload Scenario as defined in Section 4.3.3.3.

4.3.4.4.8.2.3 TCW Individual Data Display Load. Workload requirements of Section 20, Table 22 shall be verified at each individual item data quantity for an individual TCW.

4.3.4.4.8.3 Response Times

4.3.4.4.8.3.1 System Response Time Measurements. The response time and utilization requirements defined in Section 3.2.4 and 3.10 and other pertinent performance statistics shall be measured and collected as the system operates at maximum stress workload conditions during the steady-state period.

4.3.4.4.8.3.2 Individual Data Display Workload. Response times for controller input messages and display outputs shall be measured at the TCWs in accordance with Section 20, Table 22, "TCW Individual Data Display Load".

4.3.4.4.8.3.3 Simultaneous Data Display Workload. Response times for controller input messages and display outputs shall be measured at the TCWs in accordance with Section 20, Table 23,"TCW Simultaneous Data Display Load" .

4.3.4.4.8.4 Transition Times. Transition times of Section 3.2.4.3 shall be verified.

4.3.4.4.8.5 Tracking and Safety Algorithms

4.3.4.4.8.5.1 Displayed Target Position Accuracy. This test shall verify that the system meets the requirement for Displayed Target Position Accuracy defined in Section 3.2.4.4.1.

4.3.4.4.8.5.2 Displayed Target Position Accuracy Data Points. The Displayed Target Position Accuracy test shall include at least 20 data points distributed throughout the adapted control region.

4.3.4.4.8.5.3 Tracking. Tracking tests shall verify that the system meets the performance requirements for Tracking defined in Section 3.2.4.4.2.

4.3.4.4.8.5.4 Safety Algorithms. Safety Algorithms tests shall verify that the system meets the performance requirements of Section 3.2.4.4.5 for Conflict Alert/Mode C Intruder and MSAW.

4.3.4.4.8.5.5 FMA. Performance requirements of Section 3.2.4.4.4 for FMA shall be verified with tests conducted in conjunction with their respective functional tests.

4.3.4.4.8.5.6 CRDA. Performance requirements of Section 3.2.4.4.6 for CRDA shall be verified with tests conducted in conjunction with their respective functional tests.

4.3.4.4.9 Interfaces

4.3.4.4.9.1 External System Interfaces

4.3.4.4.9.1.1 Scope. External interface tests shall verify that the system is compliant with the System External Interfaces defined in Section 3.3.

4.3.4.4.9.1.2 Background Scenario. External interface tests using simulation methods shall be conducted with the Background Scenario executing concurrently.

4.3.4.4.9.1.3 Actual Interfaces. A part of the external interface tests, actual interfaces shall be used that are available at the FAA technical Center connected to STARS and operating concurrently with operational data.

4.3.4.4.9.1.4 En Route Center. A test shall be conducted with STARS interface to the NAS en route system.

4.3.4.4.9.1.5 Maximum Capacity. A test of each interface shall be conducted at the maximum capacity for the particular interface as specified in the respective IRDs and ICDs.

4.3.4.4.9.1.6 Inputs. Interfaces shall be tested using simulated and actual inputs.

4.3.4.4.9.2 Internal System Interfaces

4.3.4.4.9.2.1 Scope. Internal System Interfaces tests shall verify that the system meets the requirements for System Internal Interfaces defined in Section 3.4.

4.3.4.4.9.2.2 Background Scenario. Internal system interfaces tests shall be shall be conducted with the Background Scenario executing concurrently.

4.3.4.4.9.2.3 Maximum Capacity. A test of each interface shall be conducted at the maximum capacity for the particular interfaces specified in the respective IRDs and ICDs.

4.3.4.4.10 Confidence and Stability Tests

4.3.4.4.10.1 Purpose. The confidence and stability tests shall verify that the system is stable and can operate for an extended period of time.

4.3.4.4.10.2 Duration. The confidence and stability test shall be operated continuously for seventy-two (72) hours.

4.3.4.4.10.3 Background Scenario. The Background Scenario shall execute for the duration of the test.

4.3.4.4.10.4 Response Time. The test shall verify that system response times are in accordance with Section 3.2.4, System Performance.

4.3.4.4.10.5 Performance. The following performance metrics shall be taken throughout test:

a. Failures/Recoveries - general failure conditions (e.g., software recycling, hardware failures, manual interventions, resource failures).
b. Process Memory Utilization Growth (e.g., memory leakage)
c. CPU Utilization Growth
d. Track Count
e. Response Time Growth

4.3.4.4.11 Support Tools. Any tools, equipment, or software used to support DT&E shall have been successfully tested prior to any other testing.

4.3.4.5 Key Site System Acceptance Test

4.3.4.5.1 Purpose. These tests shall ensure that the total STARS functions in the key site environment, and that it is fully compatible with and properly interfaces with the other systems and facilities connected to the site.

4.3.4.5.2 Installation and Integration. The installation and integration tests specified in Section 4.3.2, Installation and Integration Testing, shall have been successfully completed for STARS prior to the conduct of any tests specified in this section.

4.3.4.5.3 Test Conditions

4.3.4.5.3.1 Hardware and Software. The Key Site Acceptance Tests shall be conducted using all integrated hardware and software of the STARS at the site.

4.3.4.5.3.2 Interfaces. Interface Tests shall use the actual interfaces at the Key Site.

4.3.4.5.3.3 Maximum Number of Interfaces. Testing shall incorporate the concurrent use of the maximum number of interfaces that the site will employ operationally.

4.3.4.5.3.4 TCWs and MCWs. Testing shall incorporate the use of the maximum number of TCWs and MCWs that the site will employ operationally.

4.3.4.5.3.5 Test Execution. The Key Site Acceptance Tests shall be conducted while STARS is executing operational software adapted to the site.

4.3.4.5.4 Functional Tests. The functional requirements specified in the System Capabilities, Section 3.1 and 3.2 shall be verified by performing a subset of the tests specified in Section 4.3.4.4.2.

4.3.4.5.5 Key Site Adaptation. Site Adaptation, Section 3.6, shall be adapted to the actual parameters of the key site parameters.

4.3.4.5.6 Workload. Workload tests shall verify the ability of STARS to meet the requirements in accordance with Section 3.2.4, System Performance, for the key site when the system operates at the key site workload.

4.3.4.5.7 Confidence and Stability. A confidence and stability test shall be performed on the STARS for the key site as defined in Section 4.3.4.4.10.

4.3.4.5.8 Certification Tests.

4.3.4.5.8.1 Service Certification. Tests shall be conducted to verify the Service Certification capabilities specified in Section 3.2.2.4.

4.3.4.5.8.2 Inducement of Faults. Certification tests shall include the inducement of faults and errors to verify the On-line Certification performance on a system with degraded functions.

4.3.4.5.8.3 Component Faults. Tests of Certification shall include faults across hardware and software components.

4.3.5 Contractor Acceptance Test and Evaluation (CAT&E)

4.3.5.1 Scope. All tests specified in Section 4.3.5 shall be conducted using all integrated hardware and software components that comprise STARS, and shall be conducted while the STARS is executing operational software.

4.3.5.2 Site Installation and Integration. The tests specified in Sections 4.3.2, Installation and Integration, shall have been successfully completed prior to the conduct of any tests specified in this section.

4.3.5.3 Use of Adaptation Data. The tests shall be conducted using the adaptation data of the operational site.

4.3.5.4 Site System Acceptance Tests

4.3.5.4.1 Scope. CAT&E Site System Acceptance Tests conducted at each site shall consist of a subset of FAA Technical Center System Acceptance Tests and Key Site Acceptance Tests.

4.3.5.4.2 Functional Tests. The functional requirements specified in the System Capabilities, Section 3.1 and 3.2 shall be verified by performing a subset of the tests specified in Section 4.3.4.4.2.

4.3.5.4.3 Workload. Workload tests shall verify the ability of STARS to meet the requirements specified in Section 3.2.4, System Performance for the site.

4.3.5.4.4 Confidence and Stability. A confidence and stability test shall be performed on the STARS for the site as defined in Section 4.3.4.4.10.

4.3.5.5 Service Certification. The tests of Certification specified in Section 3.2.2.4 shall include the inducement of faults and errors to verify the On-line Certification performance on a system with degraded functions.

4.4 Requirements Traceability Matrix. The verification requirements traceability matrix (VRTM) shall be as defined in Section 40.

5 REQUIREMENTS TRACEABILITY (N/A FOR SYSTEM LEVEL SPECIFICATION)

6 NOTES

6.1 Acronyms and Abbreviations.

AAS	Advanced Automation System
ac	Alternating Current
ACID	Aircraft Identification
ACP	Azimuth Change Pulse
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance Broadcast
AF	Airway Facility
AIG	Applications Interface Gateway
AMASS	Airport Movement Area Safety System
AMZ	Active Monitored Zone
ANSI	American National Standards Institute
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASCII	American Standard Code for Information Interchange
ASIFA	Advanced Automation System Static Information Format Agreement
ASIFA-P	ASIFA - Pixel Data
ASIFA-V	ASIFA - Vector Data
ASR	Airport Surveillance Radar
ASTA	Airport Surface Traffic Automation
ASTERIX	All purpose STructured Eurocontrol Radar Information eXchange
ATC	Air Traffic Control
ATCRBS	Air Traffic Control Radar Beacon System
ATCS	Air Traffic Control Specialist
ATCT	Airport Traffic Control Tower
ATIS	Automatic Terminal Information Service
CA	Conflict Alert
CAS	Commercially Available Software
CASA	Controller Automated Spacing Aid
CASE	Computer Aided Software Engineering
CAT&E	Contractor Acceptance Test and Evaluation
CCU	Central Control Unit
CD-2	Common Digitizer
CHI	Computer Human Interface
CM	Configuration Management
COTS	Commercial-Off-The-Shelf
CPU	Central Processing Unit
CRDA	Converging Runway Display Aid
CRT	Cathode Ray Tube
CTAS	Center-TRACON Automation System
DASI	Digital Altimeter Setting Indicator
DCE	Data Circuit-Terminating Equipment
DID	Data Item Description
DoD	Department of Defense
DOT	Department of Transportation

DR&A	Data Reduction And Analysis
DT&E	Development Test and Evaluation
DTE	Data Terminal Equipment
EARTS	Enroute Automated Radar Tracking System
EIA	Electronic Industries Association
EMI	Electromagnetic Interference
ESL	Emergency Service Level
ETA	Estimated Time of Arrival
ETMS	Enhanced Traffic Management System
FAA	Federal Aviation Administration
FAAAC	FAA Aeronautical Center
FAALC	FAA Logistics Center
FAATC	FAA Technical Center
fc	foot candles
FCC	Federal Communications Commission
FDIO	Flight Data Input/Output
FDP	Flight Data Processing
FIPS	Federal Information Processing Standards
FMA	Final Monitor Aid
FPCP	Flight Plan Conflict Probe
FSC	Field Support Configuration
FSL	Full Service Level
GFE	Government furnished Equipment
GFP	Government Furnished Property
GPS	Global Positioning System
GPW	General Purpose Workstation
HDR	Hardware Discrepancy Report
HOL	Higher Order Language
HWCI	Hardware Configuration Item
Hz	Hertz
ICD	Interface Control Document
IEEE	Institute of Electrical and Electronic Engineers
IFDT	Interfacility Data Transfer
IFR	Instrument Flight Rules
I/O	Input/Output
IOC	Initial Operating Capability
IRD	Interface Requirements Document
ISO	International Standards Organization
ITS	Independent Time Source
ITU-T	International Telecommunications Union-Telecommunications Standardization Sector
ITWS	Integrated Terminal Weather System
kts	knots
kv	kilovolts
LAN	Local Area Network
LCD	Liquid Crystal Display
LRR	Long Range Radar
LRU	Line Replaceable Unit
M&C	Monitor And Control
MCF	Metroplex Control Facility
MCI	Mode-C Intruder

MCP	Monitor and Control Position
MCW	Monitor and Control Workstation
Mode 3/A	Identification Reporting Mode of Secondary Radar
Mode C	Altitude Reporting Mode of Secondary Radar
MSAW	Minimum Safe Altitude Warning
msec	milli-seconds
MTBF	Mean Time Between Failure
MTBCF	Mean Time Between Critical Failure
MTTR	Mean Time To Repair
NAS	National Airspace System
NEZ	Navigational Error Zone
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
nm	nautical mile
NOAA	National Oceanic and Atmospheric Administration
NOCC	National Operations Control Center
NOS	National Ocean Service
NOZ	Normal Operating Zone
NTZ	No Transgression Zone
NWS	National Weather Service
OCC	Operations Control Center
ORD	Operational Requirements Document
OSF	Operational Support Facility
P3I	Pre-Planned Product Improvement
pF	picoFarad
PIDP	Programmable Indicator Data Processor
POSIT	Profiles for Open Systems Internetworking Technologies
POSIX	Portable Operating System Interface
PRM	Precision Runway Monitor
PTD	Proposed Time of Departure
PTR	Program Technical Report
QA	Quality Assurance
RAM	Random Access Memory
RANK	Replacement Alphanumeric Keyboard
RAPCON	Radar Approach CONtrol Facility (USAF)
RATCC	Radar Air Traffic Control Center (Navy equivalent to TRACON)
RATCF-DAIR	Radar ATC Facility -Direct Altitude and Indentification Readout
RCL	Radio Communications Link
RFP	Request For Proposal
RFSP	Replacement Flight Strip Printer
RMA	Reliability, Maintainability, Availability
RMC	Remote Monitoring and Control
RML	Radar Microwave Link
rms	Root-mean-square
ROM	Read-only Memory
RTQC	Real Time Quality Control
SAT	Site Acceptance Test
SCP	Software Change Proposal
SCSC	STARS Central Support Complex
SDC	Software Development Configuration

SIF	Standard Interchange Format
SLOC	Source Lines Of Code
SLS	Subsystem Level Specification
SMC	Software Maintenance Configuration
SPS	Standard Positioning Service
SQL	Structured Query Language
SRR	Short Range Radar
SSS	System/Subsystem Specification
STARS	Standard Terminal Automation Replacement System
STC	Software Test Configuration
STD	Standard
TATCA	Terminal ATC Automation
TCAS	Traffic Alert and Collision Avoidance System
TCB	Trusted Computing Base
TCID	Terminal Computer Identifier
TCP	Terminal Controller Position
TCW	Terminal Controller Workstation
TDW	Tower Display Workstation
TDWR	Terminal Doppler Weather Radar
TIA	Telecommunications Industry Association
TMU	Traffic Management Unit
TRACON	Terminal Radar Approach CONtrol Facility
TU	Track Update (Message ID)
TZ	Flow Control Track /Full Data Block Information (Message ID)
UL	Underwriters Laboratory
US	United States
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VRTM	Verification Requirements Traceability Matrix
WAN	Wide Area Network

6.2 Definitions

Abbreviated Flight Plan. An ATC authorized flight plan which contains only a small portion of the normal flight plan information and includes at a minimum aircraft identification (ACID), location, destination and pilot request.

Access Control. The process of limiting access to resources and objects based on the identity of subjects and/or groups to which they belong. This is accomplished through the use of appropriate physical, procedural, and hardware/software controls.

Accountability. The property that enables activities on a system to be traced to individuals with the time, method and degree of access to a system, who may then be held responsible for their actions.

Active Flight Plan. A flight plan for a flight for which an actual departure time or estimated fix time has been entered, whether the flight originates inside or outside the control area.

Active Monitored Zone (AMZ). A predefined volume of airspace for which Final Monitor Aid functions

will be provided. Targets inside the AMZ will undergo final monitor aid processing, while targets outside the AMZ will not be processed by FMA. The AMZ is intended to apply to a particular runway in a parallel approach operation. For system operation, the AMZ may be expanded to include the collective monitoring volumes for all runways being monitored. For multiple direction parallel runway monitor operations, more than one AMZ may be established.

Active Tracks. Tracks that are being correlated, corrected, and predicted for every scan.

Adaptation. The process by which automation application software is made unique to provide the required service at a specific site. The system-wide adaptation parameters defined for a specific system design allow a single software build/baseline to service all terminal areas. The site-specific adaptation parameters defined for a specific system design allow a single system software build/baseline to be customized for operation at any site. Adaptation is conducted to support system scalability and to define the specifics of the system hardware and software configuration, message validation and formulation, display organization and content, function parameters, and other location, destination and control parameters.

Adaptation Type. Refers to whether an adaptation parameter is system-wide or site-specific.

Air Route Surveillance Radar (ARSR). Long range radar (approx. 240 nm radius) used primarily to detect and display an aircraft's position while en route between terminal areas. The ARSR enables controllers to provide radar air traffic control service when aircraft are within the ARSR coverage. The ARSR may enable a facility to provide limited terminal radar services similar to, but less accurate than, those provided by an approach control radar (ASR).

Air Route Traffic Control Center (ARTCC). A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en route phase of the flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft.

Air Traffic. Aircraft operating in the air or on an airport surface other than loading ramps and parking areas.

Air Traffic Control (ATC). A service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

Air Traffic Control Specialist (ATCS). A person authorized to provide air traffic control service.

Air Traffic Controller. See Air Traffic Control Specialist.

Airport. An area on land or water that is used or intended to be used for the landing and takeoff of aircraft and includes its buildings and facilities, if any.

Airport Surveillance Radar (ASR). Approach control radar used to detect and display an aircraft's position in the terminal area. ASR provides range and azimuth information but does not provide elevation data. Coverage of the ASR can extend up to 60 nm.

Airport Traffic Control Tower (ATCT) Tower Cab. The terminal facility from which final approach (radar or non-radar), landing and take off air traffic control services are provided under both IFR and VFR conditions. Air traffic controllers within the ATCT use air/ground communication, visual signaling, a

STARS Tower Display Workstation (TDW) and other automation systems to provide ATC services to aircraft operating in the vicinity of an airport.

Airway. A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

Alarm. A visual indication of an alarm condition which may be reinforced by an audio signal.

Alarm Condition. The situation when the value of a monitored parameter is outside the specified acceptable range.

Alert. A visual indication of an alert condition which may be reinforced by an audio signal.

Alert Condition. The situation when the value of a monitored parameter is outside the specified ideal range but within the acceptable range.

Alphanumeric. A character consisting of both letters and numbers and often other symbols such as punctuation marks and mathematical symbols.

Analysis. The method of verification which consists of the processing of accumulated data obtained from other qualification methods. Examples are reduction, interpolation, or extrapolation of test results.

And. "And" is used in this specification as the logical "and". For a requirement which refers to x "and" y, both x and y must be satisfied.

Architecture. The organizational structure of system resources and the concept of interaction among them.

Associated Track. A track which is matched with a flight plan and assigned to a TCP.

Association. The link between a flight plan and track resulting from the acquisition process.

Assurance. A measure of confidence that the security features and architecture of an automated information system accurately mediate and enforce the security policy.

Authenticate. (1) To verify the identity of an operator, device, or other entity in a computer system, as a prerequisite to allowing access to resources in a system. (2) To verify the integrity of data that has been stored, transmitted, or otherwise exposed to possible unauthorized modification.

Auto Hand-off / Pointout Inhibit List. A special list that contains those positions or facilities to which automatic hand-offs or automatic pointouts have been inhibited.

Auto-Track Initiation. The process of starting a track without manual intervention.

Automatic Acquisition. The process whereby flight plan data is associated with an active track.

Automation Application Software. Custom software developed in an HOL which operates in conjunction with commercially available software (CAS) and the system hardware to provide information and conduct data transfer necessary to safely control air traffic within the terminal area, maintain the system, and conduct system training.

Availability. The degree, often expressed as probability, to which a system or component is operational and accessible when required for use.

Baseline. The initial configuration of any item (including software, hardware, requirements and documentation) which is formally designated and managed by a unique identifier and which is "frozen" at a specific time during the configuration items life cycle. The baseline, plus any approved changes, constitute the current configuration.

Beacon. A ground navigational light, radio or radar transmitter used to provide aircraft in flight with a signal to serve as a reference for the determination of accurate bearings or positions.

Beacon Code. The number assigned to a particular multiple pulse reply signal transmitted by a transponder.

Beacon Code Block. A set of beacon radar codes used in target beacon code selection.

Beacon Radar. A radar system in which the object to be detected is fitted with cooperative equipment in the form of a radio receiver/transmitter (transponder). Radar pulses transmitted from the searching transmitter/receiver (interrogator) site are received in the cooperative equipment and used to trigger a distinctive transmission from the transponder. This reply transmission, rather than a reflected signal, is displayed at an air traffic control facility.

Beacon Target. A target that results from an aircraft transponder reply to a radar interrogation.

Blink. The cyclical modulation of the intensity or brightness of a displayed object between full and zero intensity.

Blink Coding. Emphasis coding which causes specified data to blink in an on/off cycle at an adapted rate.

Build. An operational version of the system software which satisfies all current functional and performance requirements.

Certification. The technical confirmation that the system is providing, and/or is capable of providing, the specified service to the user at any given time.

Coldstart. The transition of system resources from an off-line state to an on-line state. A coldstart causes a reset of the hardware and a reload and restart of the operating system and the application software.

Collimation. The spatial alignment of search and beacon radar returns from the same target.

Collimation Error. The difference in range and azimuth between search and beacon targets from the same aircraft using a common radar pedestal.

Command. Data input through file, pointers, menu selection, function keys, keystroke combination or other entry mechanisms.

Commercial Off-The-Shelf (COTS). A hardware, software or firmware component which 1) is, or has been, offered, sold, leased, or licensed to the general public in the course of normal business operations at prices based on established catalog or market prices or 2) has been fully developed and tested, is in

production, and does not meet the criteria of 1) above solely because it is not yet available in the commercial marketplace.

Commercially Available Software (CAS). Software, for sale to the general public in the course of normal business operations at prices based on established catalog or market prices, which operates on the system hardware to perform fundamental and standard computer and network system services such as resource monitoring, data transfer, manipulation, processing, management, input and/or output. Examples include operating systems, databases, spreadsheets, editors, word processors, compilers, linkers, software build utilities and network managers.

Common Coordinate Systems. Coordinate systems with a common frame of reference, orientation, and origin for all system surveillance data.

Common Digitizer. Equipment suitable for the automatic detection, merging of search and beacon reports, and transfer of aircraft target information derived from long-range search surveillance radar and beacon radar systems.

Component. A collection of hardware or software elements considered as a single object for the purposes of monitoring and control.

Computer Hardware Resource Data Sampling Interval. An interval of time during which computer hardware utilization measurements are computed.

Computer Human Interface (CHI). In physical terms, an aspect of a computer system, implemented in both hardware and software, which permits interaction between the user and the computer's coded computational procedures. The visual displays, input devices and dialogue, taken together as a whole. In conceptual terms, the set of features that support communication between the user and the computer.

Condition. A Boolean expression of parameter value and adaptable thresholds, valid over an interval of time.

Configuration. A set of resources, their interconnections and their states.

Configuration Plan. The mapping of positions to fix pairs used in airspace sectorization.

Conflict. Any situation that exists between two or more aircraft and the airspace, or an aircraft and the terrain or obstructions, for which minimum safe separation distance defined for the airspace under control are, or may be, violated.

Conflict Alert. An indication by the automation system that two tracked, associated, mode-C transmitting aircraft are in, or are predicted to be in, conflict.

Consolidation. The combining of terminal controller positions and transferring of control of tracks and flight plans to a specific position.

Controlled Aircraft. Aircraft that are receiving and participating in traffic separation service provided by ground-based air traffic controllers.

Controller Position Symbol. A unique alphanumeric that indicates which controller is controlling an aircraft.

Coordination Fix. A geographical position used as a common reference point for coordination between facilities when performing hand-off and flight progress monitoring operations.

Correlation. The process whereby search/beacon radar data are uniquely paired with a given track. Correlation criteria usually include a code agreement and a distance criterion.

Cutover. The process of transitioning the operational system to a new version of software and/or hardware.

Data Block. A block of alphanumerics, comprised of adaptable fields, associated with a track shown on the situation view.

Data Block Offset. The distance and direction the data block is placed with respect to the target. Data block offset may be accomplished manually or automatically.

Data Entry Device. See "Input Device."

Data Entry Set. See "Input Device Set."

Demonstration. The method of verification which consists of operation of the system, or part of the system, that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis.

Depot. An FAA facility that serves as the major logistic support facility for on-site and central maintenance activities. The depot may return items for repair to a vendor facility when more cost effective. It supports the repair, alignment, calibration, complete overhaul and rebuilding of complex equipment.

Discrete Code/Discrete Beacon Code. As used in the Air Traffic Control Radar Beacon System (ATCRBS), any one of the 4096 selectable Mode 3/A aircraft transponder codes except those ending in double zero and not 75xx, 76xx, 77xx, or 1236.

Display. 1) The hardware component on which views of information are presented to the operator. Examples include a cathode ray tube (CRT), and a liquid crystal display (LCD). 2) The presentation of data and information to the system operator(s).

Display Coordinates. A coordinate system based on the actual location of an item in relationship to the display surface.

Emergency Service Level. The minimum STARS capability in which only limited functionality and performance are available.

Enhanceability. The capability to add, delete, and adapt hardware and software components to provide new and/or improved functionality, capacity and/or performance without change to the architecture or design. STARS will be enhanceable to accommodate future air traffic load growth and P3I enhancements.

Event. An occurrence at an instance of time which is significant to the operation of the system, e.g. a component state transition, or to the conduct of ATC, e.g. a low altitude violation.

External System Interface. The physical and logical connection between STARS and external systems.

Facility. The total electronic, environmental and electric power generation or distribution system, and the structures used to house, support, and/or protect the automation system and its operators. A facility may include a number of systems, subsystems, or equipment, e.g., a long-range radar facility, or it may in its entirety consist of only a single system, subsystem, or equipment such as an isolated RML/RCL repeater facility.

Failure. The cessation of the ability of a system or any of its components to perform a specified function or set of functions.

False Beacon Target. A spurious target report that is generated in addition to the "true" target report.

Firmware. 1) A set of computer instructions fixed onto a memory chip (ROM). 2) A set of machine instructions which control the sequences and operation of the controller portion of a processor and which reside on a read-only memory (ROM) chip.

Fix. A geographical reference point expressed in latitude and longitude; fixes are uniquely identified in adaptation. A fix is both an aid for navigation and a reference point for control purposes.

Fix Pair. A set combination of fixes in a defined configuration table used to direct flight data to the appropriate control position. Flight data is assigned to a control position based upon two fixes and flight status. The first fix, the entry fix, represents the point at which the flight will enter the system, e.g., for arrival, the coordination fix; for departures, the departure airport. The second fix, the exit fix, is the point at which the flight will exit the system, e.g., for arrival, the destination airport; for departures, the coordination fix.

Flashing. The cyclical modulation of the intensity or brightness of a displayed object between full and minimum (non-zero) intensity. At minimum intensity, objects are discernible by the unaided eye.

Flight Data. All data applicable to a flight including but not limited to flight plan, flight amendment, and track information.

Flight Data Processing Interface Mode. The mode of processing flight information which is used when the NAS En Route system has no radar data, but does have flight plan information.

Flight Plan. Positional fix data (location, velocity) which defines the intended flight path of an aircraft. Flight plans are submitted, processed and distributed (1) to the TRACON prior to the entrance of the aircraft into the terminal airspace or (2) to the ARTCC for VFR flights. The arrival, departure, overflight, IFR or VFR status of the flight is indicated in the flight plan.

Flight Status. Any logical combination of arrival, departure, overflight, VFR, VFR-on-Top and IFR status.

Full Service Level. The maximum STARS capability in which all specified operational and support functionality and performance are available.

Function. Any system capability.

Ground Range. The horizontal distance from the subpoint of the aircraft to an object on the ground.

Handoff. An action taken to transfer the radar identification of an aircraft from one controller to another if the aircraft will enter the receiving controller's airspace and radio communications with the aircraft will be transferred.

Hardware Component. From the design point of view, an integrated, tested collection of mechanical and electrical elements which perform simple or complex functions. Any hardware component may be configured in the on-line, off-line or standby state. From a logistics point of view, a collection of one or more line replaceable units (LRUs).

Heading Accuracy. The difference between the heading used to predict the displayed track position and the true heading of an aircraft.

Heavy Jet Indicator. An indication that an aircraft's maximum gross takeoff weight equals or exceeds a specified limit.

Higher Order Language. One of many syntactic structures of computer source code that expresses machine-level operations in terms more nearly natural to the computer programmer and more compactly than assembler code.

Ident. A special feature in the ATC Radar Beacon System equipment, used to immediately distinguish one displayed beacon target from the other beacon targets. When an indication is received by the automation system from an aircraft transponder in the beacon radar message, the aircraft target symbol and/or data block is emphasized to the TCP.

Identification. The process that enables recognition of a security entity by a system, generally by the use of unique machine-readable operator names.

Implied Entries. Context-sensitive operator commands which have a minimized syntax and which support the entry of the command requiring only that the user position a cursor on an object and press "Enter." Entry of the command name/additional parameters is not required.

Inactive Flight Plan. Flight plans for which the first converted fix is within the control area and for which either no time or an inactive time group has been included.

Information Coding Techniques. Any method used to draw the operator's attention to specific data. The techniques include brightness coding, blink or flash coding, shape coding, color coding and size coding.

Initialization. A Warmstart or Coldstart (see definition of Coldstart and Warmstart).

Input Device Set. A group of input devices from which all STARS data and command entry may be accomplished. Examples include a keyboard/trackball combination and a keyboard/mouse/touch panel combination.

Input Device. Any hardware component used by an operator to enter data and commands into STARS. Common examples include keyboards, trackballs, mouses and touch panels.

Inspection. The method of verification consisting primarily of visual examination of system components or technical examination of engineering-support documentation.

Instrument Flight Rules (IFR). The set of procedures and practices for operation and control of aircraft in which all controller and pilot decisions, actions and maneuvers are derived from aircraft and ground automation system output data.

Integrated Multiple Sensor Presentation. The presentation of multiple radar sensor data in a single display using a technique that ensures the best sensor data available, with track updates from all sensors. This display presentation ensures that multiple registrations of the same radar target are eliminated.

Integrity. A security service which pertains to ensuring that data, and data in transit, continue to be a proper representation of information, and that information processing resources continue to perform correct processing operations.

Integrity Anomalies. Irregularities in data, or data in transit, that prevent the system from performing correct processing operations.

Inter-Facility. Between adjacent facilities; for example, between ARTCC and ARTCC, between ARTCC and TRACON, etc. Contrasted with intra-facility.

Intra-Facility. Within a single facility; for example, between two positions within the same TRACON, etc. Contrasted with inter-facility.

Leader. The line connecting the target symbol to the data block on the situation display.

Lexical. Aspects of the design that pertain to the user input language, including interaction techniques specific to each physical device, and the use of information coding strategies such as color, flashing and blinking.

Line Replaceable Unit (LRU). An essential support item which is removed and replaced at the field level to restore the end item to an operationally ready condition.

Local. Communication with STARS directly without the use of external interfaces.

Local Workstations. Workstations which have direct access to the STARS automation subsystem data without the use of GFE communications.

Log-on / Log-off. Input messages that are used by the security portion of the system to provide accountability for system message inputs.

Maintainability. A measure of the ease and speed with which a system or component can be repaired and returned to the on-line state following a failure.

Maintenance. Maintenance, as used in connection with Airway Facilities systems, subsystems, and equipment, is intended to mean any specified sequence of steps prescribed to accomplish an activity to verify or continue a system or service operating.

Maximum Time to Repair. The maximum time required to localize a component failure, remove and replace the failed component and perform tests to confirm operational readiness of the component.

Mean Time Between Critical Failure. The average time between hardware or software component failures which result in a loss of service.

Mean Time Between Failure. The average time between hardware of software component failures which do not result in a loss of service.

Mean Time To Repair. The average time required to localize a component failure, remove and replace the failed component and perform tests to confirm operational readiness of the component.

Metroplex Control Facility (MCF). Any consolidation of two or more TRACONs and their associated airspace.

Minimum Safe Altitude Warning (MSAW). An indication (alarm/alert) by the automation system that the altitude of a tracked, associated, mode-C transmitting aircraft is in, or is predicted to be in, violation of the minimum safe altitude defined for the airspace under control.

Mission Critical Objects. Mission Critical Objects include the data categories: 1) Air Traffic Safety Critical Data: data whose availability and integrity are essential to flight safety, i.e. software image files, adaptation data, aircraft position data, radar data that supports the separation function. 2) Program Sensitive Data (DOD, Federal Law Enforcement Agencies, incident investigative data (based on MOAs), current weather reports and forecasts, status and diagnostic information, training data, etc.).

Mode C Non-Selected. Target is reporting Mode C altitude and is not within a beacon code filter selected by a TCP.

Mode C Selected Target. Target is reporting Mode C altitude and is within a beacon code filter selected by a TCP.

Mode 3/A. An interrogation mode in which a beacon transponder automatically reports identification when interrogated by a ground station. There are 4096 possible identification codes.

Mode C. An interrogation mode in which a beacon transponder automatically reports altitude when interrogated by a ground station.

Mode C Altitude. The altitude reported via a beacon radar transponder when interrogated by a ground station.

Mode C Intruder. An aircraft transmitting Mode-C (Transponder code and altitude) which is tracked but not associated with a flight plan and which is in conflict with (violates the separation standard minima) a tracked, associated, Mode-C transmitting aircraft.

Monitor and Control Functions. The set of capabilities required to manage and maintain the system including, but not limited to, system status monitoring, system performance monitoring, system resource control, system and service certification, component verification, hardware and software maintenance, and data reduction and analysis.

Monitor and Control Position. See "Position".

Monitor and Control Workstation (MCW). The system workstation used to perform monitor and control functions. A single MCW will consist of one or more displays, input devices, processors and power supplies.

Multiple Sensor Display - Presentation. The presentation of air traffic data from integrated multiple radar sensors as a single display presentation.

Navigational Error Zone (NEZ). A predefined area of airspace located between the final approach courses of each adjacent pair of parallel runways, starting at the outer limit of the NTZ. This zone is a non-critical protection area in which an aircraft on final approach to its assigned runway is not expected to enter.

No Transgression Zone (NTZ). A predefined area of airspace located between the final approach courses of each adjacent pair of parallel runways. This zone is an area in which an aircraft on final approach to its assigned runway should not enter. It is a protective zone for ensuring proper separation of parallel approaching aircraft.

Non-Controlled Aircraft. Those aircraft not participating in or receiving traffic separation service from the ATC system. This term does not include those flights receiving any kind of control service from control towers.

Non-Discrete Code. A radar beacon Mode 3/A four digit octal code in which the last two digits are zeros. Non-discrete codes are normally reserved for radar facilities that are not equipped with discrete coding capability and for other purposes such as emergencies (7500, 7600, 7700), VFR aircraft (1200), etc..

Non-En Route System Messages. Interfacility data messages associated with flight plans that do not originate from the En Route system , formerly called ARSA messages, transferred to an adjacent TRACON via the En Route system where that system acts simply as a message router.

Non-Mode C Non-Selected. Target is not reporting Mode C altitude and is not within a beacon code filter selected by a TCP.

Non-Mode C Selected. Target is not reporting Mode C altitude and is within a beacon code filter selected by a TCP.

Normal Operating Zone (NOZ). An area of airspace around each final approach course centerline that is not part of any NTZ or NEZ.

Notification. Information provided to the operator indicating the occurrence of an event.

Nuisance Alert. An unwarranted alert message to a specialist, warning of a present or predicted unsafe situation.

Off-line State. The condition wherein a system resource is not configured for, and is not available for, operational use.

On-line State. The condition wherein a system resource is configured for operational use.

Operator. Any person who interacts directly with a computer system.

Operator Class. An operator role that contains a grouping of operator functions.

Or. "Or" is used in this specification as the logical inclusive "or". For a requirement which refers to x "or" y, x or y or both may be satisfied. In no case does the use of "or" imply that STARS must implement

only one part of the requirement.

Overflight. A flight which 1) traverses a given airspace without landing or 2) operates in a given airspace for an extended period of time.

Packet Filtering. A method of evaluating an external message unit for access control into STARS.

Page Printing Device. A hardware component capable of single pixel addressing and therefore capable of outputting more than standard ASCII text. This allows for multiple fonts and graphics generation.

Parameter. In the context of monitoring, the term refers to a measurable attribute of a resource.

Parrot. A beacon permanent echo from a fixed transponder which "squawks" each time the beacon radar illuminates it.

Partition. A subset of system resources configured to provide a desired set of functionality while operating concurrently with, and without disruption to, the operation of other system resources.

Password. A character string that may be used to authenticate an identity.

Peak RMS Error. The largest RMS error observed for a specified interval.

Permanent-Echo. Radar signals reflected from fixed objects on the earth's surface; e.g., buildings, towers, terrain. Permanent echoes are distinguished from "ground clutter" by being definable locations rather than large areas. Under certain conditions they may be used to check radar alignment.

Pointout. An action taken by a controller to transfer the radar identification of an aircraft to another controller if the aircraft will or may enter the airspace or protected airspace of another controller and radio communications will not be transferred.

Position. 1) A logical entity consisting of the collection of data and information required to perform a set of required functions. A position may be hosted on any capable workstation. Any active position may be associated with one or more input device sets. STARS functionality is allocated to two types of positions, the Terminal Controller Position and the Monitor and Control Position. 2) Location of a target with respect to the origin of a specified coordinate system.

Position Error. The distance between the true aircraft position and the corresponding predicted track position before the latter is updated.

Position Symbol. A computer-generated indication shown on a radar display to indicate the reported position and mode of tracking.

Position Deviation. The distance between a target radar reported position (time corrected) and the corresponding predicted track position before the latter is updated.

Pre-Planned Product Improvement (P3I). A future modification to the system hardware and/or software which will provide additional or enhanced functionality and/or performance.

Preference Set. A profile of desired display attributes consisting of display adjustments and view customizations which are stored and recalled at will by an operator. Preference sets permit the operator to

set attributes in advance, to save attributes, to change attributes, and to invoke them as a set. Multiple preference sets can be specified and saved by each operator.

Preventive Maintenance. Routine, scheduled cleaning, adjustment, lubrication, part replacement, etc. required to preserve the equipment and reduce the chance of failure.

Preview Area. A view, or portion of a view, which displays command input during composition and prior to entry by the operator.

Primitive. A basic unit of software code used as a building block to create more complex software.

Radar Coordinates. A coordinate system based on the geographic location of an item in relation to a radar(s) or the surveillance coverage area common coordinate system.

Radar Data. When used without qualification, "radar" or "radar data" generally include both primary radar and beacon radar information received by an interrogator site.

Radar Messages. The set of radar data associated with a live or simulated radar return. Radar Message types include Beacon Radar Data, Search Radar Data, Radar System Status, Test, Map, Strobe, and Weather data.

Radar Reinforced Beacon Target Report. A beacon target report merged with its associated search report.

Radar Scan. The period required for a radar to make one complete revolution.

Range Rings. Concentric circles displayed within a view which indicate the constant, scaled range from the controller selected origin.

Reconfiguration. Changing the state or interconnection of resources.

Redundant Coding. The use of more than one coding technique to encode data. For example, the presentation of information in a view using both color coding and flashing.

Reflection. A reflected beacon reply which is the result of a return path being established between the beacon radar's antenna and the aircraft via a manmade reflecting object. It is distinct from multi-path. Reflected beacon target reports will have range or azimuth errors or both because of the indirect path over which the interrogation and/or reply was obtained. The reflected return is a type of false target. Search radars may also experience reflections, but, because of the two-way propagation loss, they are much more infrequent.

Registration. The spatial alignment of the slant-range beacon radar returns, for the same target, at approximately the same time.

Registration Error. The inconsistencies in the reported target range and azimuth received from several radars interrogating the same target at the same time.

Reliability. The degree, often expressed as MTBF, that a system or component will perform a required function under specific conditions for a specified period of time.

Remote. Communication with STARS indirectly through the use of external interfaces.

Remote Displays. Displays connected via GFE communications to provide access to the STARS automation subsystem.

Remote Maintenance Facilities. The STARS remote maintenance facilities are the nine Operational Support Facilities (OSFs) and the STARS Central Support Complex (SCSC). Each OSF contains an OSF maintenance subsystem. The SCSC contains the SCSC maintenance subsystem. The SCSC maintenance subsystem and one OSF maintenance subsystem interface to a STARS automation subsystem via the automation subsystem's remote maintenance interface.

Remote Maintenance Subsystems. The STARS remote maintenance subsystems are the OSF maintenance subsystem and the SCSC maintenance subsystem. The remote maintenance subsystems are used to perform centralized remote hardware and software maintenance of some or all of the STARS automation subsystems located at operational sites.

Requirement Validation. The process of confirming that a STARS system capability is compliant with the corresponding system specification requirement.

Requirement Verification. The process of confirming that a system requirement is operating correctly.

Resectorization. The reassigning of airspace responsibility to positions.

Resource. A hardware component, software component or external interface.

Resource State. An attribute of a resource that characterizes its condition. (See On-Line State, Off-Line State, Standby State)

Resource Status. The information about the location and state of a resource at a particular time.

Response Time. The time required to achieve a desired action or output from the system.

Return-To-Normal Condition. The situation when the value of a monitored parameter returns to within the specified ideal and acceptable ranges.

Ringaround. A target for which the radar receives many reports due to lack of sidelobe (and backlobe) suppression. Ringaround targets are characterized by many target reports at nearly the same range but at different azimuths.

Scalability. The capability to add, delete and adapt hardware and software components to meet the needs of a specific site without change to the system architecture or design. The capability to scale the system configuration will provide a tailored terminal automation system with the capacity, functionality and performance required to provide adequate air traffic control service under a specified air traffic load.

Scan-To-Scan Speed Change Stability. The magnitude of displayed speed change from scan to scan.

Scratch Pad. A data field in the data block that is 1) entered by a controller to make special notations concerning an aircraft and 2) entered automatically by the system to present information such as airport and runway destination for an aircraft after passing an adapted location.

Search Radar. That form of radar that depends upon reception of reflected electromagnetic energy for the

detection of objects in the area under surveillance. A radar system in which a transmitted pulse is reflected by an object, received and processed.

Search Target. A detection that results from the reflection of a radar transmission by an object such as an aircraft.

Sectorization. Change of configuration plan within a terminal area of a TRACON.

Security Audit Trail. A set of records that collectively provide documented evidence of processing used to aid in tracing from original transactions forward to related records and files, and/or backwards from records to their component source transactions.

Security Functional Testing. The portion of security testing in which the advertised features of a system are tested for correct operation.

Security Object. A passive entity that contains or receives information. Access to an object potentially implies access to the information it contains. Examples of objects are: password files, security audit logs, access control lists, operator permissions, records, segments, files, directories, and programs, processors, video displays, keyboards, printers, network nodes, etc. and Personal Sensitive Data (data falling within the Privacy Act).

Security Policy. The set of laws, rules, and practices that regulate how an organization manages, protects, and distributes sensitive information.

Security Relevant Event. Any event that attempts to change the security state of the system (e.g., change discretionary access controls, change user password, etc.). Also, any event that attempts to violate the security policy of the system, (e.g., too many attempts to log in).

Security Subject. An active entity, generally in the form of a person, process, or device that initiates information flow among objects or changes the system state.

Selected Data. Any one of various types of data that are available within the system, e.g. CDR data, performance data, system analysis data, or problem determination data.

Self-Contained Unit. A unit having within itself everything that is necessary to perform defined functionalities.

Semantic. Aspects of the design that pertain to displayed objects, object properties, user commands, and CHI-initiated functions.

Sensor Data. Primitive discrete data that is obtained from a monitoring device such as a radar.

Service Certification. The process through which the end-to-end thread that provides the moment-to-moment separation of aircraft is confirmed to be operating properly. The process of confirming that, under specified conditions, the system as a whole operates in conjunction with its external interfaces to provide the required service functionality and performance.

Service Interruption. Loss of both Full Service Level and Emergency Service Level.

Service Level. An indication of the functional and performance capability provided by STARS; service

levels include Full Service Level and Emergency Service Level.

Shall. The word "shall" is specifically used whenever a specification expresses a provision that is binding or identifies a characteristic that a system must possess in order to be acceptable to the acquirer.

Simulation. The process of generating and controlling target report and flight plan data for the purpose of system testing and controller training.

Single Point of Failure. A non-redundant hardware or software component, the failure of which will result in loss of service.

Single Sensor Ground Position Display-Presentation. The presentation of air traffic data based on the transformation of line-of-sight data to the ground plane.

Single Sensor Slant Position Display-Presentation. The presentation of air traffic data based on one sensor's line-of-sight data.

Site Adapted Software. A complete, executable software image which has been customized to operate at a specific operational site. Each executable image is built from automation application software, commercially available software (CAS) , system-wide adaptation data and site-specific adaptation data.

Slant Range. (1) Measurements of range along the line of sight. (2) The actual straight line distance between an aircraft in flight and a ground location (radar, DME). This distance is greater than the geographical surface range because of the altitude of the aircraft.

Software Component. A collection of computer programs and data considered as a single object for the purposes of monitoring and control. A software component may be in the on-line, off-line or standby state.

Special Data Block Symbology. Data block is in some way differentiated from other adapted "standard" data blocks. For example, data block may be bolded or data block may blink.

Special Position Indicator. An indicator which is used in place of a controller position symbol to note special circumstances. For example, an "X"as a position symbol represents an aircraft destined for specific runway.

Speed Accuracy. The difference between the displayed speed and the true speed of an aircraft.

Standby State. The condition wherein a system resource is not configured for, but is available for, operational use.

State. See resource state.

Status. See resource status, flight status and flight plan.

Steady-State Track Establishment Time. The number of scans required for transient RMS errors to decrease to steady-state values following completion of a turn.

Strobe. Radar reports that define an area of interference. The area is defined by start and stop ranges on an azimuth line. The runlength contained in the target report defines the angular extent of the strobe.

Subsystem. Two or more configurations integrated according to an engineering design in which the independent functionalities and performance of each configuration combine to provide a specified or required service.

Summarization Interval. An interval of time in which the System Workload Data Sampling Interval, Computer Hardware Resource Data Sampling Interval and Traffic Data Sampling Interval data are to be summarized for display.

Surveillance. The service through which a sensor(s) external to an airborne platform determines the position of the platform, either using navigation or airborne compatible equipment (e.g ATCRBS), position information from the aircraft, (dependent surveillance) or without the use of position information from the aircraft or airborne compatible equipment (independent surveillance).

Surveillance Coverage Area. The largest rectangular geographic volume of space for which surveillance processing is required by STARS.

Surveillance System. A system which detects and reports the location of aircraft and/or objects.

Switching Adaptation Data. Changing adaptation data and beginning execution with new parameter values.

Switching Automation Application Software. Changing from one version of application software to another and beginning execution.

System. A collection of subsystems integrated according to an engineering design in which the independent functionalities and performance of each subsystem combine to provide a specified or required end-to-end service. The Standard Terminal Automation Replacement System is composed of four subsystems: the automation subsystem, OCC support subsystem, OSF maintenance subsystem and the SCSC subsystem. STARS itself is a subsystem of the National Airspace System (NAS).

System Certification. The process of confirming that the hardware and software components of the system are operating correctly.

System Workload Data Sampling Interval. An interval of time during which track flight plan and radar report measurements are made.

Tailor. To configure CAS for operational use.

Target. 1) Any discrete object which reflects or transmits energy back to the radar equipment. 2) The indication shown on a radar display resulting from a search radar return or a beacon reply.

Target Extent Symbol. An indication displayed at the location of the target symbol and under the controller position symbol which is proportional to the uncertainty in the radar reported target position.

Target Report. A message received from an external radar sensor that contains position and other information on an aircraft detected by the sensor. The target report could also represent a false target resulting from imperfect performance of the sensor.

Target Symbol. A computer-generated indication of an aircraft's position resulting from a search return

or a radar beacon reply.

Terminal Area. The airspace in which control service or airport traffic control service is provided.

Terminal Controller Position. See "Position".

Terminal Controller Workstation (TCW). The system workstation used to perform terminal area air traffic control and controller training. A single TCW will consist of a cabinet housing one display and one or more sets of input devices, processors and power supplies. Each STARS will be configured with multiple TCWs.

Terminal Radar Approach Control (TRACON). A terminal air traffic control facility, usually collocated with an air traffic control tower (ATCT), in which the STARS will be installed. Air traffic controllers within the TRACON will use the STARS to provide traffic control services.

Test. The method of verification which consists of operation of the system, or part of the system, using instrumentation or other special test equipment to collect data for later analysis.

Test Mode. The system is not accepting live system inputs and is not being used to control live air traffic.

Test Target. A synthetic target generated internally to simulate a primary or beacon radar target report.

Touch Screen. A data input device consisting of a transparent panel mounted across the face of a display that is divided into sections which are sensitive to the application of pressure or heat and provide the programmed or intended electrical response.

Tower Display Workstation (TDW). The system workstation located in an ATCT capable of hosting the TCP.

Track. The locus of positions grouped over time which defines the path of an aircraft in flight as referenced to a desired coordinate system (e.g., slant range (range, azimuth), geographical or Cartesian (range-x, range-y, range-z)).

Track Ball. A data input device consisting of a ball that rotates freely within its mount and several buttons. Rotation of the ball using the palm of the human hand moves a position identifier (cursor) on a display. Activation of the trackball buttons initiates a command input action.

Track Loss. A track is considered lost when there is no correlation of the track with the correct sensor data for 10 consecutive track update periods.

Track Reliability. A measure of track quality under various conditions of aircraft maneuvers.

Track Swap. A situation in which two target reports received from two tracked aircraft in close proximity are incorrectly correlated.

Track Swap Probability. The probability that a track ceases to correlate with the correct target reports and instead tracks a proximate target after a swap opportunity.

Traffic Data Sampling Interval. An interval of time during which traffic count measurements are made.

Transient Accuracy. The peak RMS error observed during a specified interval.

Transponder. The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System (ATCRBS) which automatically receives radio signals from interrogators on the ground, and selectively replies with a specific reply pulse group only to those interrogations being received on the mode to which it is set to respond.

Transponder Indicators. Situations such as emergency, hijack, radio failure, suspect aircraft and ident are indicated to a TCP based on a set of adapted transponder codes (i.e. beacon code 7700 should indicate an emergency situation).

Unassociated Track. A track which is not matched to a flight plan by STARS.

Uncontrolled Aircraft. Those aircrafts not participating in or receiving traffic separation service from the ATC system. This does not include those flights receiving control service from control towers having only visual surveillance to perform control service.

Useable Display Area. The area of the screen for actual display of information on a workstation display.

UTC (Coordinated Universal Time). UTC is the time provided in world-wide time signal broadcasts used in aviation.

Verification. The process of confirming that a system resource is operating correctly.

VFR On Top. An IFR flight plan which allows a pilot desiring to climb through a cloud, haze, smoke, or other meteorological formation to select an altitude or flight level (subject to any ATC restrictions). Upon reaching the selected altitude, the pilot can 1) cancel the IFR flight plan upon reaching VFR weather conditions, or 2) continue with the IFR flight plan while operating in VFR when conditions warrant above, below, between meteorological layers, or in areas where there is no meteorological obscuration.

View. A logical collection of data arranged according to computer human interface formatting guidelines which is presented to an operator via the workstation display. Views present information to the operator in text and/or graphic format. The most common example is a window.

Visual Flight Rules (VFR). The set of rules, procedures and practices employed to operate and control aircraft when human visibility exceeds a specified standard. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements.

Warmstart. The transition of system resources from an off-line state to an on-line state. A warmstart does not reset the hardware and it does not reload the operating system software; it reloads and restarts application software.

Warning Time. The amount of time between the presentation of the full alert to the TCP and the time of the conflict.

Workstation. An integrated set of hardware and software components; including one or more data entry devices, processors, displays, power sources, and equipment cabinets; which is used by an operator to accomplish air traffic control, system maintenance, monitoring and control, or training.

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10 AUTOMATION PERFORMANCE DATA

10.1 Performance Tables. Tables 1 through 14 contain the performance data requirements for the Tracking, Conflict Alert (CA), and Minimum Safe Altitude Warning (MSAW) functions.

TABLE 1 Long and Short Range Surveillance Sensor Characteristics

	Sensor Channel	
	ATCRBS	Primary
Long Range Radars		
Scan time	10-12 secs	10-12 secs
False reports	Less than 1/scan	Less than 350/scan
Blip/Scan	95%	90%
Azimuth standard deviation	0.23 deg	0.18 deg
Azimuth quantization	0.0879 deg	0.0879 deg
Range standard deviation	0.12 nmi	0.08 nmi
Range quantization	0.125 nmi	0.125 nmi
Altitude standard deviation*	50 ft	-
Altitude quantization	100 ft	-
Maximum radar bias Range Azimuth	0.5 nmi 0.176 deg	0.5 nmi 0.176 deg
Short Range Radars		
Scan time	4-5 sec	4-5 sec
False reports	Less than 1/scan	Less than 350/scan
Blip/Scan	95%	90%
Azimuth standard deviation	0.23 deg	0.18 deg
Azimuth quantization	0.0879 deg	0.0879 deg
Range standard deviation	0.04 nmi	0.04 nmi
Range quantization	0.0156 nmi	0.0156 nmi
Altitude standard deviation*	50 ft	-
Altitude quantization	100 ft	-
Maximum radar bias Range Azimuth	0.125 nmi 0.176 deg	0.125 nmi 0.176 deg

*Includes altitude quantization.

TABLE 2 Aircraft Motion Characteristics

Speed (kts)	20 to 700
Altitude Change Rate (ft/min)	-6000 to +10,000
Acceleration (g)	-1.5 to +3.8
Vertical Acceleration (g)	1/64 to 1/4

TABLE 3 Track Loss Probability, Short Range Radar Inputs

Environment/Maneuver	Track Loss Probability (%)
Discrete beacon/any*	0
Non-discrete beacon and search/straight and level	1.1
Non-discrete beacon or search/turning**	14.9

* Any aircraft motion conforming to the characteristics in Table 2.
** 400 kt aircraft turning 180° at 2°/sec at an average range of 42 nmi.

Notes
1. A track loss occurs when a track fails to correlate for 10 consecutive radar scans and at least one target report from the target to be tracked is available during this time.
2. Requirements assume a clutter-free environment and no beacon garble.
3. Requirements apply to the STARS displayed outputs.
4. Requirements apply to a tracker using inputs from one or multiple radars when the radar closest to the aircraft is a short-range radar.
5. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 4 Track Swap Probability, Short Range Radar Inputs

Mode	Swap Scenario*	Swap Probability (%)
Non-Discrete Code Track vs. Non-Discrete Code Track (same code, no Mode C)	100 kt Overtake	0
	30° Crossing	1.1
	Head-on Approach	0
Search Track vs. Search Track	100 kt Overtake	0
	30° Crossing	1.1
	Head-on Approach	0
Discrete Code Track vs. Discrete Code (different code) Track**	Any	0
Discrete Code Track vs. Non-Discrete Code Track**	Any	0
Non-Discrete Code Track (no Mode C) vs. Search Track	Any	0
Non-Discrete Code Track (no Mode C) vs. Search Target	Any	0

* Aircraft speeds are 300 and 400 kts for 100 kt overtake, 300 kts for 30° crossing, and 200 kts for head-on approach.

** Includes beacon garble.

Notes

1. A track swap opportunity occurs when two aircraft follow paths that cross at shallow angles (0 to 60 degrees) during which the minimum approach distance is less than one nautical mile and the difference in speeds is less than 150 knots. Track swap probability is the probability that a track ceases to correlate with the correct target reports and instead tracks a proximate target after a swap opportunity. A track swap occurs if it results in a persistent misidentification (5 consecutive scans) or a track loss after a swap opportunity.
2. Requirements assume a clutter-free environment and no beacon garble, unless otherwise indicated.
3. Requirements apply to the STARS displayed outputs.
4. Requirements apply to a tracker using inputs from one or multiple radars when the radar closest to the aircraft is a short-range radar.
5. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 5 Steady State Position Accuracy, Short Range Radar Inputs

Sensor	Speed (kts)	Range (nmi)	Straight-Line Radial Mean Position Error (nmi)
Beacon Only, Search Only, and Beacon and Search	100	40 - 50	0.10
	250	30 - 50	0.10
	400	20 - 50	0.10

Notes
1. The beacon and search environment indicates that beacon and search reports from a single target are merged.
2. The search only environment characterizes a beacon failure or non-beacon equipped aircraft.
3. The beacon only environment characterizes a radar failure.
4. Requirements assume a clutter-free environment and no beacon garble.
5. Requirements apply to the STARS displayed outputs exclusive of display equipment errors.
6. Requirements apply to a tracker using inputs from one or multiple radars when the radar closest to the aircraft is a short-range radar.
7. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 6 Steady State Position Accuracy, Long Range Radar Inputs

Sensor	Speed (kts)	Range (nmi)	Straight-Line Radial Mean Position Deviation* (nmi)
Beacon and Search	100	60	0.33
	250	60	0.33
	400	60	0.33

* The range standard deviation is 0.125 nmi. and the azimuth standard deviation is 2.5 ACP. The blip-scan ratio is unity.

Notes
1. The beacon and search environment indicates that beacon and search reports from a single target are merged.
2. Requirements assume a clutter-free environment and no beacon garble.
3. Requirements apply to the STARS displayed outputs exclusive of display equipment errors.
4. Requirements apply to a tracker using inputs from one or multiple radars when the radar closest to the aircraft is a long-range radar.

TABLE 7 Steady State Speed Stability, Short Range Radar Inputs

Sensor	Speed (kts)	Range (nmi)	Straight-Line Radial Scan-to-Scan Speed Change Stability* (%)	
			0 kts	> 10 kts
Beacon and Search	100	40 - 50	70	0.91
	250	30 - 50	74	0.11
	400	20 - 50	73	0.53

* Speed is assumed to be displayed in units of 10 kts.

Notes
1. The beacon and search environment indicates that beacon and search reports from a single target are merged.
2. Requirements assume a clutter-free environment and no beacon garble.
3. Requirements apply to the STARS displayed outputs.
4. Requirements apply to a tracker using inputs from one or multiple radars when the radar closest to the aircraft is a short-range radar.
5. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 8 Transient Speed Stability, Short Range Radar Inputs

Sensor	Speed (kts)	Range (nmi)	Turn Rate (deg/sec)	Turn (deg)	Turning Scan-to-Scan Speed Change Stability* (%)	
					0-10 kts	> 10 kts
Beacon and Search	100	36 - 48	3	180	95	5
	250	36 - 48	2	180	94	6
	400	36 - 48	2	180	90	10

* Speed is assumed to be displayed in units of 10 kts.

Notes
1. The beacon and search environment indicates that beacon and search reports from a single target are merged.
2. Requirements assume a clutter-free environment and no beacon garble.
3. Requirements apply to the STARS displayed outputs.
4. Requirements apply to a tracker using inputs from one or multiple radars when the radar closest to the aircraft is a short-range radar.
5. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 9 Steady State Speed Accuracy, Short and Long Range Radar Inputs

Sensor	Speed (kts)	Range (nmi)	Straight-Line Tangential RMS Speed Error (kts)
Search Only and Beacon and Search	100	36 - 48	11
	250	36 - 48	10
	400	36 - 48	10

Notes
1. The beacon and search environment indicates that beacon and search reports from a single target are merged.
2. The search only environment characterizes a beacon failure or non-beacon equipped aircraft.
3. Requirements assume a clutter-free environment and no beacon garble.
4. Requirements apply to the STARS displayed outputs.
5. Requirements apply to a tracker using inputs from one or multiple radars.
6. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 10 Steady State Heading Accuracy, Short and Long Range Radar Inputs

Sensor	Speed (kts)	Range (nmi)	Straight-Line Radial RMS Heading Error (deg)
Beacon and Search	100	40 - 50	12
	250	30 - 50	6
	400	20 - 50	3

Notes
1. The beacon and search environment indicates that beacon and search reports from a single target are merged.
2. Requirements assume a clutter-free environment and no beacon garble.
3. Requirements apply to the STARS displayed outputs.
4. Requirements apply to a tracker using inputs from one or multiple radars.
5. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 11 Transient Track Position, Speed and Heading Accuracy, Short Range Radar Inputs

Sensor	Speed (kts)	Range (nmi)	180-Degree Turn, Short-Range Peak RMS Error*		
			Position (nmi)	Speed (kts)	Heading (deg)
Beacon and Search	100	36 - 48	0.3	33	51
	250	36 - 48	0.4	25	30
	400	36 - 48	0.4	38	31

* Active, updating tracks only.

Notes
1. The beacon and search environment indicates that beacon and search reports from a single target are merged.
2. Requirements assume a clutter-free environment and no beacon garble.
3. Requirements apply to the STARS displayed outputs exclusive of display equipment errors.
4. Requirements apply to a tracker using inputs from one or multiple radars when the radar closest to the aircraft is a short-range radar.
5. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 12 Time to Establish Steady-State Tracking, Short Range Radar Inputs

Sensor	Speed (kts)	Range (nmi)	Time to Establish Steady-State Tracking* (scans)		
			Position	Speed	Heading
Beacon and Search	100	36 - 48	6	9	5
	250	36 - 48	9	12	8
	400	36 - 48	10	15	10

* Time required to establish steady-state tracking after completion of a 180° turn. Requirements include active, updating tracks only.

Notes
1. The beacon and search environment indicates that beacon and search reports from a single target are merged.
2. Requirements assume a clutter-free environment and no beacon garble.
3. Requirements apply to the STARS displayed outputs.
4. Requirements apply to a tracker using inputs from one or multiple radars when the radar closest to the aircraft is a short-range radar.
5. *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements* includes descriptions of the scenarios.

TABLE 13 Conflict Alert Rate of Detection Requirements

Traffic/Warning Requirement	Probability/Rate of Detection (%)
Warning time >30 sec. with steady-state tracks	70
Warning time >0 sec. with steady-state tracks	96
Warning time >30 sec. with realistic traffic mix	59
Warning time >0 sec. with realistic traffic mix	90

Notes

1. Requirements assume the use of the sensors in Table 1 and aircraft motion conforming to the characteristics in Table 2.
2. Requirements are based on encounter situations and scenarios defined in *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements.*

TABLE 14 Minimum Safe Altitude Warning Rate of Detection Requirements

Traffic/Warning Requirement	Probability/Rate of Detection (%)
Warning time >30 sec. with realistic traffic mix	45
Warning time >0 sec. with realistic traffic mix	94
Nuisance Alert Rate with realistic traffic mix	4

Notes
1. Requirements assume the use of the sensors in Table 1 and aircraft motion conforming to the characteristics in Table 2.
2. Requirements are based on traffic flight paths and scenarios defined in *Development Methodology for the Standard Terminal Automation Replacement System (STARS) Functional Performance Requirements.*

20 WORKLOAD DATA

20.1 Workload Tables. Tables 15 through 23 contain the maximum automation subsystem and display workload requirements.

TABLE 15 Automation Subsystem Workload, Sources and Destinations of Data

SOURCE	DESTINATIONS
Surveillance Sensors	16
Long-Range Sensors	4
Short-Range Sensors	12
Interfacility Interfaces	
Host Interfaces*	8
ETMS	1
TCWs and TDWs	128

* Each TRACON may be a separate terminal area with each individual terminal area eligible to have a separate interface to an en route automation system computer.

TABLE 16 Automation Subsystem Workload, Airspace Defintion

ITEM	WORKLOAD VALUE
Terminal Areas	8
Surveillance Coverage Area	400x400 nmi.
Terminal Configuration Plans	80
Terminal Fix Pairs	2500
Airports*	40
Geographic Maps	
Lines per map (average)	1000
Symbols per map (average)	200
Maps per facility	225

*Airports which require Conflict Alert and/or Minimum Safe Altitude Warning functionality

TABLE 17 Automation Subsystem Workload, System Data Capacity

ITEM	WORKLOAD VALUE
Unique Tracked Aircraft	
Associated*	600
Unassociated	750
Flight Plans	4500

*Average associated track life is 18 minutes

TABLE 18 Automation Subsystem Workload, Input Message Rates

MESSAGE	MESSAGE RATE
Surveillance Inputs	
Target Reports (aircraft)**	7000 reports/radar scan
Primary (Search) Reports Not From Aircraft Targets	5750 reports/radar scan
Peak System Target Reports (aircraft and non-aircraft)	3900 reports/sec
Surveillance Weather Input	
ARSR Weather (Average)***	15 msgs/radar/sec 80 msgs/radar/scan 300 msgs/radar/cycle****
ARSR Weather (Peak) ***	75 msgs/radar/sec 360 msgs/radar/scan 1300 msgs/radar/cycle****
ASR-9 (Peak)	17 msgs/radar/sec
Manually Entered Messages	
Track Control Messages*	
Track	
Initiate Control	300 messages/hour
Terminate Control	1855 messages/hour
Hand-off	
Initiate Transfer	3480 messages/hour
Accept Transfer	3005 messages/hour
Flight Plan	
Entry	335 messages/hour
Modification	355 messages/hour

*Assume equal distribution of controlled aircraft across control positions with at least one position having 20 tracks under its control. Message rates do not specify the maximum rate for individual messages. The combined peak rate of all manually entered messages is 27 messages per peak second.

**Represents the effects of multiple radar coverage and radar coverage beyond facility boundaries. 45% of target reports are from long range radars and 60% of these target reports will be passed by the STARS geographic area target filtering.

*** In computing aggregate load from multiple radars, assume one at the peak sensor rate and the balance at average sensor rate

****A cycle consists of the multiple scans required to convey complete 360 degree weather map information

TABLE 19 Automation Subsystem Workload, Additional Input Message Rates

MESSAGE	MESSAGE RATE
Manually Entered Messages (continued)	
Display Control Messages*	
Position Display Configuration	505 messages/hour
Relocate Data Area	335 messages/hour
Track Data Display	7610 messages/hour
Data Block Modification	1890 messages/hour
Other	345 messages/hour
System Messages*	50 messages/hour
Host Messages	
Track Data	
Initiate Transfer	1095 messages/hour
Track Update	22215 messages/hour
Accept/Recall Transfer	1140 messages/hour
Flight Plan Data	
Flight Plan	2520 messages/hour
Amendment	1060 messages/hour

*Assume equal distribution of controlled aircraft across control positions with at least one position having 20 tracks under its control. Message rates do not specify the maximum rate for individual messages. The combined peak rate of all manually entered messages is 27 messages per peak second.

**Represents the effects of multiple radar coverage and radar coverage beyond facility boundaries. 45% of target reports are from long range radars and 60% of these target reports will be passed by the STARS geographic area target filtering.

*** In computing aggregate load from multiple radars, assume one at the peak sensor rate and the balance at average sensor rate

****A cycle consists of the multiple scans required to convey complete 360 degree weather map information

TABLE 20 Automation Subsystem Workload, Output Message Rates

MESSAGE	MESSAGE RATE*
Transfer Data to Host	
Transfer Initiate	1335 messages/hour
Track Update	41915 messages/hour
Transfer Accept	1120 messages/hour
Departure	1215 messages/hour
Terminate Beacon Code	2225 messages/hour
Transfer Data to Tower Display (per display)	
Data Block - 21 alphanumerics	35 Data Blocks/radar scan
Data Block - 15 alphanumerics	105 Data Blocks/radar scan
Target Symbols**	210 Symbols/radar scan
Tabular Data Entries	400 messages/hour
Transfer Data to Traffic Management	
Track Update	36,000 messages/hour
Conflict Alert***	75 messages/hour
Mode C Intruder***	160 messages/hour
Minimum Safe Altitude Warning***	520 messages/hour

*Message rates do not specify the maximum rate for individual messages.
**Includes target symbols transferred to tower display as part of Data Block.
***Average duration of a conflict alert is 9.9 seconds, average Mode C Intruder alert duration is 14.7 seconds, and average MSAW alert duration is 9.1 seconds.

TABLE 21 Automation Subsystem Workload, Single Sensor Peak Target Rates

Peaking Interval	Long Range Target Rate	Short Range Target Rate
90 degree quadrant	400	250
11.25 degree sector	N/A	50
1.2 degree wedge (1.3 degree for SRR)	20	16

Note: Surveillance targets will not necessarily be distributed uniformly around each radar site

TABLE 22 TCW Individual Data Display Workload

Display Item*	Individual Item Count	Remarks
Data Block and Leader	100	21 alphanumerics each (avg)
Data Block and Leader	200	15 alphanumerics each (avg)
Data Block	100	1 alphanumerics each (avg)
Data Block and Leader	50	5 alphanumerics each (avg)
Data Block and Leader	300	13 alphanumerics each (avg)
Radar Target Data (Present, and Five Histories) - Primary (noise + aircraft) - Beacon (unassociated tracks)	 2700 1800	 Position symbol Position symbol
Target Extent Symbol (present position) - Associated tracks	 400	Smaller than 0.2x0.2 inches
Tabular Data (Entries) - Arrival/Departure - Tower - Coast/Suspend - MSAW/CA Warning Status - VFR Flight Plan - Run Down - Radar Statistics Display (maintenance position) - CA Zone Suppression Status - Hospital	 26 9 32 10 10 9 25 10 20	 15 alphanumerics per entry (avg) 12 alphanumerics per entry (avg) 12 alphanumerics per entry (avg) 17 alphanumerics per entry (avg) 13 alphanumerics per entry (avg) 40 alphanumerics per entry (avg) 20 alphanumerics per entry (avg) 10 alphanumerics per entry (avg) 15 alphanumerics per entry (avg)
System Data Display (alphanumerics per display area)	400	14 entries per display
Range Rings	50	Circle, 2 nmi. increments with 100 nmi. display range
Geographic Map Lines	10000	Lines
Geographic Map Symbols	2000	Single symbol
Compass Rose	1	
Weather Areas	9000	Non-overlapping rectangles, .08" by .42" average size

* This table specifies the quantity of each display item that is required to be displayable individually by item. It is not required that the specified quantity of all items be displayable simultaneously.

TABLE 23 TCW Simultaneous Data Display Workload

Display Item	Simultaneous Item Count	Remarks
Data Block and Leader	50	21 alphanumerics each (avg)
Data Block and Leader	100	15 alphanumerics each (avg)
Data Block	5	1 alphanumerics each (avg)
Data Block and Leader	30	5 alphanumerics each (avg)
Data Block and Leader	150	13 alphanumerics each (avg)
Radar Target Data (Present) - Primary (noise + aircraft) - Beacon (unassociated tracks)	 300 150	 Position symbol Position symbol
Radar Target Data (Three Histories) - Primary (noise + aircraft) - Beacon (unassociated tracks)	 900 450	 Position symbol Position symbol
Target Extent Symbol (present position) - Associated tracks	 155	Smaller than 0.2x0.2 inches
Tabular Data (Entries) - Arrival/Departure - Coast/Suspend - MSAW/CA Warning Status	 26 4 3	 15 alphanumerics per entry (avg) 12 alphanumerics per entry (avg) 17 alphanumerics per entry (avg)
System Data Display (alphanumerics per display area)	102	9 entries per display
Range Rings	9	Circle, 5 nmi. increments with 45 nmi. display range
Geographic Map Lines	2000	Lines
Geographic Map Symbols	400	Single symbol
Compass Rose	1	
Weather Areas	3100	Non-overlapping rectangles, .11" by .58" average size

30 RELIABILITY DATA

30.1 Reliability Tables. Tables 24 through 27 contain the STARS Automation Subsystem and Component reliability requirements.

TABLE 24 Configuration Reliability Requirements For First Site Delivery

Configuration	MTBF In Hours For Failures Less Than Or Equal To Five Seconds	MTBCF In Hours For Failures Greater Than Five Seconds
Full Service Level Configuration*	30	10,000
Emergency Service Level Configuration	30	10,000

* This only applies to FSL ATC Operational and FSL System Operational Functionality

TABLE 25 Component Reliability Requirements For First Site Delivery

Configuration	MTBF In Hours For Failures Less Than Or Equal To Six Minutes	MTBCF In Hours For Failures Greater Than Six Minutes
Terminal Controller Workstation	500	7,500
Monitor And Control Workstation	500	7,500
Tower Display Workstation	500	7,500
Data Recording Device	N/A	5,000
Other Equipment Not Elsewhere Specified	N/A	5,000

TABLE 26 Configuration Reliability Requirements For Twentieth Site Delivery

Configuration	MTBF In Hours For Failures Less Than Or Equal To Five Seconds	MTBCF In Hours For Failures Greater Than Five Seconds
Full Service Level Configuration*	300	100,000
Emergency Service Level Configuration	300	100,000

* This only applies to FSL ATC Operational and FSL System Operational Functionality

TABLE 27 Component Reliability Requirements For Twentieth Site Delivery

Configuration	MTBF In Hours For Failures Less Than Or Equal To Six Minutes	MTBCF In Hours For Failures Greater Than Six Minutes
Terminal Controller Workstation	2,000	7,500
Monitor And Control Workstation	2,000	7,500
Tower Display Workstation	2,000	7,500
Data Recording Device	N/A	5,000
Other Equipment Not Elsewhere Specified	N/A	5,000

40 QUALIFICATION DATA

40.1 Verification Requirements Traceability Matrix. Table 28 contains the verification methods to be applied during DT&E and PAT&E to verify that the system conforms to each requirement in this specification.

TABLE 28 Verification Requirements Traceability Matrix (VRTM)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3	Requirements		X				
3.1	Service Levels		X				
3.1.1	Full Service Level (FSL)	--	X				
3.1.1.1	ATC Operational Functionality	--			X		
3.1.1.2	System Operational Functionality	--			X		
3.1.1.3	System Support Functionality	--			X		
3.1.1.4	Concurrent Operation	--					X
3.1.1.5	Emergency Service Level (ESL) Resources Off-Line	--					X
3.1.1.6	Performance	--					X
3.1.2	Emergency Service Level	--	X				
3.1.2.1	ATC Display	--	X				
3.1.2.1.1	Display of Target Data	--	X				
3.1.2.1.1.1	Radar Coordinates	--				X	
3.1.2.1.1.2	Sensor Identification	--					X
3.1.2.1.1.3	Surveillance Target Display	--	X				
3.1.2.1.1.3.1	Target Extent Symbol	--		X			
3.1.2.1.1.3.2	Target Position Symbol	--					X
3.1.2.1.1.3.3	Target Position History	--					X
3.1.2.1.1.4	Aircraft Information	--					X
3.1.2.1.1.5	Filters	--	X				
3.1.2.1.1.5.1	Selected Beacon Codes	--					X
3.1.2.1.1.5.2	All Beacon Codes Selected	--					X
3.1.2.1.1.5.3	Altitude Filter	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.1.2.1.1.6	Radar Range Rings	--		X			
3.1.2.1.1.7	Maps	--					X
3.1.2.1.1.8	Weather	--	X				
3.1.2.1.1.8.1	Displayed Levels	--		X			
3.1.2.1.1.8.2	Targets in Weather	--				X	
3.1.2.1.2	Display of Lists and Tabular Data	--	X				
3.1.2.1.2.1	Display Coordinates	--				X	
3.1.2.1.2.2	System Data	--					X
3.1.2.1.2.3	Compass Rose	--		X			
3.1.2.1.3	ESL ATC Display Control	--	X				
3.1.2.1.3.1	Radar Source Selection	--	X				
3.1.2.1.3.1.1	ESL Radar Source Selection on TCW	--					X
3.1.2.1.3.1.2	ESL Radar Source Selection on Local TDW	--					X
3.1.2.1.3.1.3	ESL Radar Source Selection on Remote TDW	--					X
3.1.2.1.3.2	Brightness Control	--				X	
3.1.2.1.3.3	Character Size Control	--				X	
3.1.2.1.3.4	Number of Target Position Histories	--				X	
3.1.2.1.3.5	Beacon Code Block Selection	--				X	
3.1.2.1.3.6	Selection of All Beacon Codes	--					X
3.1.2.1.3.7	Altitude Filter Control	--				X	
3.1.2.1.3.8	Range Display Control	--				X	
3.1.2.1.3.9	Display Center	--				X	
3.1.2.1.3.10	Range Ring Display Control	--				X	
3.1.2.1.3.11	Map Selection	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.1.2.1.3.12	Barometric Pressure	--				X	
3.1.2.1.3.13	Weather Level Selection	--				X	
3.1.2.1.3.14	Enable/Disable Compass Rose	--				X	
3.1.2.2	ESL Monitor and Control Functionality	--	X				
3.1.2.2.1	Resource Status Display	--		X			
3.1.2.2.2	Diagnostics	--					X
3.1.2.2.3	Restart	--					X
3.1.2.2.4	Certification	--			X		
3.1.2.3	ESL Performance	--					X
3.1.2.4	FSL Resources Off-Line	--					X
3.1.3	Service Level Display	--	X				
3.1.3.1	ATC Operational Service Level Selection	--					X
3.1.3.2	System Operational Service Level Selection	--					X
3.1.3.3	Available Service Levels Indicated	--					X
3.1.4	Recovery	--	X				
3.1.4.1	Recovery From Power Failure	--				X	
3.1.4.2	Recovery from System Resource Failure	--					X
3.1.4.3	State After Recovery	--					X
3.2	System Capabilities		X				
3.2.1	Air Traffic Control Operational Functions		X				
3.2.1.1	Surveillance		X				
3.2.1.1.1	Surveillance Sources	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.1.1.1	Multiple Surveillance Sources	--					X
3.2.1.1.1.2	Redundant Interfaces	--					X
3.2.1.1.1.3	Data Selection	--					X
3.2.1.1.2	Target Data	--	X				
3.2.1.1.2.1	Target Types	--				X	
3.2.1.1.2.2	Registration Error Correction	--				X	
3.2.1.1.2.3	Collimation Error Correction	--					X
3.2.1.1.2.4	Target Data Filtering	--					X
3.2.1.1.2.5	Coordinate Conversion	--					X
3.2.1.1.2.6	Mode C Altitude	--	X				
3.2.1.1.2.6.1	Mode C Altitude Pressure Correction	--					X
3.2.1.1.2.6.2	Source Data For Pressure Correction	--				X	
3.2.1.1.2.7	Permanent Echo Search Targets	--				X	
3.2.1.1.2.8	Parrot Targets	--				X	
3.2.1.1.2.9	Test Targets	--					X
3.2.1.1.2.10	Reflected Beacon Target Suppression	--				X	
3.2.1.1.2.11	Ringaround Beacon Target Suppression	--				X	
3.2.1.1.3	Surveillance Weather	--	X				
3.2.1.1.3.1	Weather Messages	--				X	
3.2.1.1.3.2	Weather Filtering	--				X	
3.2.1.1.3.3	Coordinate Conversion	--				X	
3.2.1.1.4	Strobe Messages	--			X		
3.2.1.1.5	Real Time Quality Control (RTQC) Messages	--			X		

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.1.6	Status And Radar Identification Messages	--					X
3.2.1.1.7	Radar Data Reporting	--	X				
3.2.1.1.7.1	Radar Data Counts	--					X
3.2.1.1.7.2	Radar Error Messages	--					X
3.2.1.2	Tracking		X				
3.2.1.2.1	General	--	X				
3.2.1.2.1.1	Target Types	--					X
3.2.1.2.1.2	Beacon Target Loss	--					X
3.2.1.2.1.3	Radar Sources	--	X				
3.2.1.2.1.3.1	Single Radar Source	--					X
3.2.1.2.1.3.2	Multiple Radar Sources	--	X				
3.2.1.2.1.3.2.1	Tracking	--					X
3.2.1.2.1.3.2.2	Adapted Geographic Areas	--					X
3.2.1.2.1.3.2.3	Selection of Surveillance Data	--					X
3.2.1.2.1.3.3	Radar Types	--					X
3.2.1.2.2	Correlation	--					X
3.2.1.2.3	Track Update	--	X				
3.2.1.2.3.1	Correlated Track Update	--					X
3.2.1.2.3.2	Uncorrelated Track Update	--					X
3.2.1.2.3.3	Consecutive Non-Correlations	--					X
3.2.1.2.3.4	Uncorrelated Hand-off Track Update	--					X
3.2.1.2.3.5	Track Update Message Interruption	--					X
3.2.1.2.4	Automatic Track Initiation	--	X				
3.2.1.2.4.1	Uncorrelated Target Reports	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.2.4.2	Search-Only Targets	--					X
3.2.1.2.5	Altitude Tracking	--	X				
3.2.1.2.5.1	Altitude Track Update	--					X
3.2.1.2.5.2	Unreasonable Mode C Data	--					X
3.2.1.2.5.3	Missing Mode C Data	--					X
3.2.1.2.6	Automatic Acquisition	--	X				
3.2.1.2.6.1	Track Association	--					X
3.2.1.2.6.2	Auto-Acquisition Eligibility	--					X
3.2.1.2.6.3	Inhibit For Duplicate Codes	--					X
3.2.1.2.6.4	Non-Updating Tracks	--					X
3.2.1.2.6.5	Special Automatic Acquisition	--	X				
3.2.1.2.6.5.1	Adapted Beacon Codes	--					X
3.2.1.2.6.5.2	Adaptable Flight Data	--					X
3.2.1.2.7	Automatic Drop	--	X				
3.2.1.2.7.1	Disassociate Track In Auto-Drop Area	--					X
3.2.1.2.7.2	Flight Plan Retention	--					X
3.2.1.2.7.3	Track Re-acquisition	--	X				
3.2.1.2.7.3.1	Re-acquisition	--					X
3.2.1.2.7.3.2	Arrival Track Re-acquisition	--					X
3.2.1.2.7.3.3	Interfacility Arrival Track	--					X
3.2.1.2.7.3.4	Disassociate Track	--					X
3.2.1.3	Conflict Alert (CA) /Mode C Intruder (MCI)		X				
3.2.1.3.1	General	--	X				
3.2.1.3.1.1	Conflict Alert	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.3.1.2	Mode C Intruder	--					X
3.2.1.3.1.3	Conflict Alert Surveillance Sources	--					X
3.2.1.3.1.4	Look-Ahead Time	--					X
3.2.1.3.1.5	Conflict Parameters	--					X
3.2.1.3.2	Conflict Types	--	X				
3.2.1.3.2.1	Current Conflict	--					X
3.2.1.3.2.2	Predicted Conflict	--					X
3.2.1.3.2.3	Maneuvering Conflicts	--					X
3.2.1.3.2.4	Parallel Approach Conflicts	--					X
3.2.1.3.3	Conflict Alert Areas	--					X
3.2.1.3.4	Conflict Alert Display	--	X				
3.2.1.3.4.1	Output Conflicts	--					X
3.2.1.3.4.2	Conflict Reporting Duration	--					X
3.2.1.3.4.3	Alert Data	--					X
3.2.1.3.5	Event Display	--					X
3.2.1.4	Final Monitor Aid (FMA)		X				
3.2.1.4.1	Zone Definitions	--	X				
3.2.1.4.1.1	Active Monitored Zone (AMZ)	--					X
3.2.1.4.1.2	No Transgression Zone (NTZ)	--					X
3.2.1.4.1.3	Navigational Error Zone (NEZ)	--					X
3.2.1.4.1.4	Normal Operating Zone (NOZ)	--					X
3.2.1.4.2	Operation	--	X				
3.2.1.4.2.1	Track Eligibility	--					X
3.2.1.4.2.2	Zone Penetration	--					X
3.2.1.4.2.3	Predicted Zone Violation	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.4.2.4	Missing Surveillance Data Condition	--					X
3.2.1.4.2.5	Runway Mistake Detection	--	X				
3.2.1.4.2.5.1	Track Stabilization	--					X
3.2.1.4.2.5.2	Runway Mismatch	--					X
3.2.1.4.2.5.3	Runway Designator	--					X
3.2.1.4.2.6	Alert Suppression	--	X				
3.2.1.4.2.6.1	Outside NOZ	--					X
3.2.1.4.2.6.2	Approaching Adjacent NOZ	--					X
3.2.1.4.2.6.3	Aircraft Not Assigned to Monitored Runways	--					X
3.2.1.4.2.6.4	Aircraft Not Assigned to Any Runway	--					X
3.2.1.4.3	Position Enable/Disable	--	X				
3.2.1.4.3.1	FMA Enable/Disable	--					X
3.2.1.4.3.2	Activate/Deactivate Zone	--					X
3.2.1.4.4	Print Messages	--	X				
3.2.1.4.4.1	Event Display	--					X
3.2.1.4.4.2	Enable/Disable Actions	--					X
3.2.1.5	Minimum Safe Altitude Warning (MSAW)		X				
3.2.1.5.1	General Terrain Monitor	--	X				
3.2.1.5.1.1	Monitor Altitude	--					X
3.2.1.5.1.2	Altitude Source	--					X
3.2.1.5.1.3	Vertical Profile	--					X
3.2.1.5.1.4	First Segment	--					X
3.2.1.5.1.5	Second Segment	--					X
3.2.1.5.1.6	Terrain Map Resolution	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.5.1.7	Map Formats	--					X
3.2.1.5.2	Approach Path Monitor	--	X				
3.2.1.5.2.1	Monitor Approach Altitude	--					X
3.2.1.5.2.2	Monitor For Altitude Boundary	--					X
3.2.1.5.3	MSAW Volumes	--	X				
3.2.1.5.3.1	Aural Alarm Volume	--					X
3.2.1.5.3.2	Aural Alarm Inhibit Volume	--					X
3.2.1.5.3.3	General Terrain Inhibit Volume	--					X
3.2.1.5.3.4	Departure Inhibit Volume	--					X
3.2.1.5.4	MSAW Display	--	X				
3.2.1.5.4.1	Low Altitude Alerts	--					X
3.2.1.5.4.2	Identical Alerts	--					X
3.2.1.5.4.3	Alert Duration	--					X
3.2.1.5.4.4	Minimum Alert Time	--					X
3.2.1.5.5	Inhibit Codes	--					X
3.2.1.5.6	Event Display	--					X
3.2.1.6	Converging Runway Display Aid (CRDA)		X				
3.2.1.6.1	Geometry	--	X				
3.2.1.6.1.1	Target Reference	--					X
3.2.1.6.1.2	Image Reference	--					X
3.2.1.6.1.3	Qualification Region	--					X
3.2.1.6.1.4	Application	--					X
3.2.1.6.2	Operation	--	X				
3.2.1.6.2.1	Track Eligibility	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.6.2.2	Standard Ghosting Range Location	--					X
3.2.1.6.2.3	Standard Ghosting Lateral Location	--					X
3.2.1.6.2.4	Data Field Entries	--					X
3.2.1.6.3	Position Enable/Disable	--	X				
3.2.1.6.3.1	CRDA Enable/Disable	--					X
3.2.1.6.3.2	Activate/Deactivate Application	--					X
3.2.1.6.4	Print Messages	--					X
3.2.1.7	Controller Automated Spacing Aid (CASA)		X				
3.2.1.7.1	CRDA Functionality	--					X
3.2.1.7.2	Qualification Region	--					X
3.2.1.7.3	Mirror Image Ghosting	--					X
3.2.1.7.4	Ghosting On Target Line	--					X
3.2.1.7.5	Ghosting On Parallel Target Line	--					X
3.2.1.7.6	Print Messages	--					X
3.2.1.8	Flight Data Processing		X				
3.2.1.8.1	Terminal Computer Identification Assignment (TCID)	--		X			
3.2.1.8.2	Beacon Code Banks	--					X
3.2.1.8.3	Flight Plan Entered at the TCP	--	X				
3.2.1.8.3.1	Time Default	--					X
3.2.1.8.3.2	Flight Data Default	--					X
3.2.1.8.4	TCP To Receive Flight Plan Data	--	X				
3.2.1.8.4.1	Flight Plans Entered at the TCP	--	X				
3.2.1.8.4.1.1	TCP Specified	--					X
3.2.1.8.4.1.2	Specified TCP Consolidated	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.8.4.1.3	TCP Not Specified	--					X
3.2.1.8.4.1.4	Entering TCP Consolidated	--					X
3.2.1.8.4.2	Interfacility Flight Plans	--					X
3.2.1.8.5	Flight Plan Creation For Formation Break-up	--					X
3.2.1.8.6	Terminate Storage of Flight Plan Data	--					X
3.2.1.8.7	Handoff Processing	--	X				
3.2.1.8.7.1	Interfacility	--	X				
3.2.1.8.7.1.1	Interfacility Destination TCP Handoff	--					X
3.2.1.8.7.1.2	TCP Specified in Initiate Transfer Message	--					X
3.2.1.8.7.1.3	Interfacility Consolidated TCP	--					X
3.2.1.8.7.1.4	Handoff Redirection	--					X
3.2.1.8.7.2	Intrafacility	--	X				
3.2.1.8.7.2.1	Intrafacility Destination TCP Handoff	--					X
3.2.1.8.7.2.2	TCP Input	--					X
3.2.1.8.7.2.3	Intrafacility Consolidated TCP	--					X
3.2.1.8.7.3	Effect of Handoff Accept Action	--					X
3.2.1.8.7.4	Effect of Handoff Recall Action	--					X
3.2.1.8.7.5	Manual Handoff Processing	--	X				
3.2.1.8.7.5.1	Interfacility Manual Handoff Processing	--	X				
3.2.1.8.7.5.1.1	Flights With ARTCC Flight Plans	--	X				
3.2.1.8.7.5.1.1.1	Manual Initiation With Specification Of TCP	--					X
3.2.1.8.7.5.1.1.2	Manual Initiation Without Specification Of TCP	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.8.7.5.1.1.3	Interfacility Manual Acceptance of Flights with ARTCC Flight Plans	--					X
3.2.1.8.7.5.1.2	Interfacility Manual Handoff of Flights Using Non-En Route System Flight Plans	--	X				
3.2.1.8.7.5.1.2.1	Manual Initiation	--					X
3.2.1.8.7.5.1.2.2	Manual Acceptance	--					X
3.2.1.8.7.5.1.3	Overflight Rejection in Interfacility Manual Handoff	--					X
3.2.1.8.7.5.2	Intrafacility Manual Handoff Processing	--	X				
3.2.1.8.7.5.2.1	Manual Initiation	--					X
3.2.1.8.7.5.2.2	Manual Acceptance	--					X
3.2.1.8.7.5.3	Handoff Acceptance Prohibition	--	X				
3.2.1.8.7.5.3.1	Handoff Via Implied Command	--					X
3.2.1.8.7.5.3.2	Track Beyond Adaptable Range	--					X
3.2.1.8.7.6	Automatic Handoff Processing	--	X				
3.2.1.8.7.6.1	Automatic Interfacility Handoff Initiation Processing	--	X				
3.2.1.8.7.6.1.1	Flights With Filed ARTCC Flight Plans	--					X
3.2.1.8.7.6.1.2	Conditions for Interfacility Automatic Initiation of Handoff Processing	--					X
3.2.1.8.7.6.2	Automatic Intrafacility Handoff Processing	--	X				
3.2.1.8.7.6.2.1	Auto-Initiation	--					X
3.2.1.8.7.6.2.2	Auto-Acceptance	--					X
3.2.1.8.7.6.2.3	Conditions for Intrafacility Automatic Handoff Processing	--	X				
3.2.1.8.7.6.2.3.1	Auto-Initiation	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.8.7.6.2.3.2	Auto-Acceptance	--					X
3.2.1.8.7.6.3	Default Settings for Enabling Disabling Automatic Handoff Processing	--					X
3.2.1.8.8	TRACON Sectorization	--	X				
3.2.1.8.8.1	Terminal Areas	--					X
3.2.1.8.8.2	Terminal Area Configuration Plan	--					X
3.2.1.8.8.3	Configuration Plans	--					X
3.2.1.8.8.4	Minimum Number of Configuration Plans	--					X
3.2.1.8.8.5	Configuration Plan Available at Coldstart	--					X
3.2.1.8.8.6	Resectorization	--	X				
3.2.1.8.8.6.1	Terminal Area Independence	--					X
3.2.1.8.8.6.2	Flight Plan Information and Track Reassignment	--					X
3.2.1.8.8.6.3	No Effect On Current Flight Plans and Tracks	--					X
3.2.1.8.8.6.4	Resectorization Results in Deconsolidation	--					X
3.2.1.8.8.6.5	Partial Resectorization	--					X
3.2.1.8.9	Consolidating Positions	--	X				
3.2.1.8.9.1	Full Consolidation	--	X				
3.2.1.8.9.1.1	Transfer of Track and Flight Plan Control and Display	--					X
3.2.1.8.9.1.2	Transfer of Flight Plan Processing Data	--					X
3.2.1.8.9.1.3	Exclusion of VFR Track and Flight Plan Control and Display	--					X
3.2.1.8.9.2	Basic Consolidation	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.8.9.2.1	Transfer of Track and Flight Plan Control and Display	--					X
3.2.1.8.9.2.2	Transfer of Flight Plan Processing Data	--					X
3.2.1.8.9.3	Limited Consolidation	--	X				
3.2.1.8.9.3.1	Transfer of Track and Flight Plan Control and Display	--					X
3.2.1.8.9.4	Deconsolidation	--					X
3.2.1.9	Interfacility Data Transfer (IFDT)		X				
3.2.1.9.1	Enabling and Disabling Interfacility Data Transfer	--	X				
3.2.1.9.1.1	Results of Enabling - Flight Plan Deletion	--					X
3.2.1.9.1.2	Results Of Disabling Interfacility Data Transfer	--					X
3.2.1.9.2	Message Processing	--					X
3.2.1.9.3	Enhanced Traffic Management Messages	--	X				
3.2.1.10	Air Traffic Control Operational Data Entry		X				
3.2.1.10.1	TCP Entry	--				X	
3.2.1.10.2	Implied Controller Entries	--				X	
3.2.1.10.3	Macro Command	--				X	
3.2.1.10.4	General Validation Criteria	--	X				
3.2.1.10.4.1	Operator Authority	--					X
3.2.1.10.4.2	Command Logic Override	--					X
3.2.1.10.4.3	Duplication Within Entry	--				X	
3.2.1.10.4.4	Format Errors	--				X	
3.2.1.10.4.5	Validity	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.10.4.6	Parameter Bounds	--					X
3.2.1.10.4.7	Duplicate ACID	--				X	
3.2.1.10.4.8	Duplicate Beacon	--				X	
3.2.1.10.5	Control of Data Blocks	--	X				
3.2.1.10.5.1	Pointout	--	X				
3.2.1.10.5.1.1	Pointout	--				X	
3.2.1.10.5.1.2	Pointout - Recall	--				X	
3.2.1.10.5.1.3	Pointout Acknowledge	--				X	
3.2.1.10.5.2	Control Operations	--	X				
3.2.1.10.5.2.1	Arrival Fix Areas	--				X	
3.2.1.10.5.2.2	Initiate Control	--				X	
3.2.1.10.5.2.3	Suspend Track	--				X	
3.2.1.10.5.2.4	Activate Suspended Track	--				X	
3.2.1.10.5.2.5	Enable Automatic Acquisition	--				X	
3.2.1.10.5.2.6	Terminate Control - Single Track	--				X	
3.2.1.10.5.2.7	Terminate All Tracks	--				X	
3.2.1.10.5.2.8	Track Reposition	--				X	
3.2.1.10.5.3	Handoff	--	X				
3.2.1.10.5.3.1	Initiate	--				X	
3.2.1.10.5.3.2	Recall	--				X	
3.2.1.10.5.3.3	Forced Recall	--				X	
3.2.1.10.5.3.4	Accept	--				X	
3.2.1.10.5.3.5	Forced Accept	--				X	
3.2.1.10.5.3.6	Automatic Handoff	--	X				
3.2.1.10.5.3.6.1	Automatic Handoff Initiate - Aircraft	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.10.5.3.6.2	Automatic Handoff Accept - Aircraft	--				X	
3.2.1.10.5.3.6.3	Automatic Handoff Initiate - TCP	--				X	
3.2.1.10.5.3.6.4	Automatic Handoff Accept - TCP	--				X	
3.2.1.10.5.3.7	Redirection of Handoff	--				X	
3.2.1.10.5.4	Request Range and Heading	--				X	
3.2.1.10.5.5	Data Block Force	--					X
3.2.1.10.6	Control of Flight Data	--	X				
3.2.1.10.6.1	Automatic Flight Plan Generation	--					X
3.2.1.10.6.2	Display Flight Data	--				X	
3.2.1.10.6.3	Intrafacility Flight Data Entry	--				X	
3.2.1.10.6.4	Modify Intrafacility Flight Data	--				X	
3.2.1.10.6.5	VFR Interfacility Flight Data Entry	--				X	
3.2.1.10.6.6	Flight Data - Formation Breakup	--				X	
3.2.1.10.6.7	Manually Entered Departure Flight Data	--				X	
3.2.1.10.6.8	Request Flight Data	--				X	
3.2.1.10.6.9	Flight Plan - Retransmit	--				X	
3.2.1.10.7	Control of Displayed Data	--	X				
3.2.1.10.7.1	Converging Runway Display Aid (CRDA)	--	X				
3.2.1.10.7.1.1	CRDA Application	--				X	
3.2.1.10.7.1.2	CRDA Special Aircraft - Force	--				X	
3.2.1.10.7.1.3	CRDA Special Aircraft - Associated Aircraft	--				X	
3.2.1.10.7.1.4	CRDA Special Aircraft - TCW	--				X	
3.2.1.10.7.1.5	CRDA Display Options	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.10.7.2	Controller Automated Spacing Aid (CASA)	--	X				
3.2.1.10.7.2.1	Mirror Image Ghosting	--				X	
3.2.1.10.7.2.2	Target Reference Line Ghosting	--				X	
3.2.1.10.7.2.3	Parallel Target Reference Line Ghosting	--				X	
3.2.1.10.7.2.4	Terminate CASA Special Aircraft Symbology	--				X	
3.2.1.10.7.2.5	CASA Application	--				X	
3.2.1.10.7.2.6	CASA Special Aircraft - TCW	--				X	
3.2.1.10.7.2.7	CASA Special Aircraft - Force	--				X	
3.2.1.10.7.2.8	CASA Display Options	--				X	
3.2.1.10.7.3	Final Monitor Aid (FMA)	--	X				
3.2.1.10.7.3.1	FMA - TCW Enable/Disable	--				X	
3.2.1.10.7.3.2	FMA Runway	--				X	
3.2.1.10.7.3.3	Caution/Warning Alerts	--				X	
3.2.1.10.7.3.4	Active Monitored Zones (AMZs)	--				X	
3.2.1.10.7.3.5	FMA NTZ and NEZ	--				X	
3.2.1.10.7.4	CA/MCI Inhibit	--				X	
3.2.1.10.7.5	MSAW Alert Inhibit	--				X	
3.2.1.10.7.6	Altimeter	--				X	
3.2.1.10.7.7	Automatic Terminal Information System (ATIS)	--					X
3.2.1.10.7.8	Unique General Information	--				X	
3.2.1.10.7.9	Altitude Restriction	--				X	
3.2.1.10.7.10	Geographic Restriction	--				X	
3.2.1.10.7.11	Emergency Information	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.10.7.12	Hospital Information Display	--					X
3.2.1.10.7.13	Hospital Location	--				X	
3.2.1.10.7.14	Beacon Code Readout	--	X				
3.2.1.10.7.14.1	Single Track	--				X	
3.2.1.10.7.14.2	All Tracks - TCW	--				X	
3.2.1.10.7.14.3	Adapted Beacon Code Banks	--					X
3.2.1.10.7.15	Parrot Display	--				X	
3.2.1.10.7.16	Permanent Echo	--				X	
3.2.1.10.7.17	Quicklook	--				X	
3.2.1.10.7.18	Filters	--	X				
3.2.1.10.7.18.1	Altitude Filter - Associated	--				X	
3.2.1.10.7.18.2	Altitude Filter - Unassociated	--				X	
3.2.1.10.7.18.3	Beacon Code Filter	--				X	
3.2.1.10.7.18.4	Beacon Code Filter-Unassociated	--				X	
3.2.1.10.7.18.5	Display Filter Settings	--				X	
3.2.1.10.7.19	Select Mode 2	--				X	
3.2.1.10.7.20	Hold	--				X	
3.2.1.10.7.21	Coordination Information	--	X				
3.2.1.10.7.21.1	Coordination Messages	--				X	
3.2.1.10.7.21.2	Coordination Message Composition	--				X	
3.2.1.10.7.21.3	Coordination Message Editing	--				X	
3.2.1.10.7.21.4	Coordination Message - Send	--					X
3.2.1.10.7.21.5	Coordination Message - Response	--				X	
3.2.1.10.7.21.6	Message Acknowledge	--					X
3.2.1.10.8	Control of TCW Information	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.10.8.1	Select ESL	--				X	
3.2.1.10.8.2	System Data	--				X	
3.2.1.10.8.3	Operator Sign-on/Sign-off	--				X	
3.2.1.10.8.4	Training Mode	--				X	
3.2.1.10.8.5	Aural Alarm Enable/Disable	--				X	
3.2.1.10.8.6	Display Brightness	--				X	
3.2.1.10.8.7	Brightness Control	--				X	
3.2.1.10.8.8	Display Center	--				X	
3.2.1.10.8.9	Character Size	--				X	
3.2.1.10.8.10	Data Lists	--	X				
3.2.1.10.8.10.1	Display of Lists	--				X	
3.2.1.10.8.10.2	Relocate	--				X	
3.2.1.10.8.10.3	Access To Data	--				X	
3.2.1.10.8.11	Display Maps	--				X	
3.2.1.10.8.12	Pointer Initial Position Activation	--				X	
3.2.1.10.8.13	Pointer Initial Position Selection	--				X	
3.2.1.10.8.14	Range Rings	--				X	
3.2.1.10.8.15	Range Ring Intervals	--				X	
3.2.1.10.8.16	Range Ring Off-Center	--				X	
3.2.1.10.8.17	Display Range	--				X	
3.2.1.10.8.18	Target Position History	--				X	
3.2.1.10.8.19	Alarm Volume	--				X	
3.2.1.10.8.20	Weather	--				X	
3.2.1.10.8.21	Weather Mapping	--				X	
3.2.1.10.8.22	Display Presentation Mode	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.10.8.23	Sensor Selection	--				X	
3.2.1.10.8.24	Leader Direction Control	--	X				
3.2.1.10.8.24.1	Automatic Offset - Single Aircraft	--				X	
3.2.1.10.8.24.2	Automatic Offset - TCW	--				X	
3.2.1.10.8.24.3	Offset Data Block Type	--				X	
3.2.1.10.8.24.4	Offset Single Data Block	--				X	
3.2.1.10.8.24.5	Leader Length	--				X	
3.2.1.10.8.24.6	Manual Leader Entries	--					X
3.2.1.10.8.25	Preference Sets	--	X				
3.2.1.10.8.25.1	Multiple Preference Sets	--				X	
3.2.1.10.8.25.2	Activate ATC Operator Preferences	--				X	
3.2.1.10.8.25.3	Adaptable Preferences	--					X
3.2.1.10.8.25.4	Modification Of Preference Sets	--				X	
3.2.1.10.8.25.5	Save Current Display To A Preference Set	--				X	
3.2.1.10.8.25.6	Default Preference Sets	--				X	
3.2.1.10.9	Control of System Wide Data	--	X				
3.2.1.10.9.1	Position Acceptance of Entries	--				X	
3.2.1.10.9.2	Altimeter	--				X	
3.2.1.10.9.3	ATIS	--					X
3.2.1.10.9.4	Interfacility Message Printout	--				X	
3.2.1.10.9.5	Automatic Handoff Processing - Entire System	--				X	
3.2.1.10.9.6	IFDT - Entire System	--				X	
3.2.1.10.9.7	System Control of Safety Functions	--	X				
3.2.1.10.9.7.1	CA Processing - Entire System	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.10.9.7.2	CASA Processing - Entire System	--				X	
3.2.1.10.9.7.3	CRDA Processing - Entire System	--				X	
3.2.1.10.9.7.4	FMA Processing - Entire System	--				X	
3.2.1.10.9.7.5	MCI Processing - Entire System	--				X	
3.2.1.10.9.7.6	CA/MCI Processing - Adaptation	--					X
3.2.1.10.9.7.7	MSAW Processing - Entire System	--				X	
3.2.1.10.9.7.8	MSAW Approach Monitor	--				X	
3.2.1.10.9.8	Test Targets	--				X	
3.2.1.10.9.9	Performance Monitoring	--				X	
3.2.1.10.9.10	System Date	--				X	
3.2.1.10.9.11	System Time	--				X	
3.2.1.10.9.12	Reset System Date and Time	--				X	
3.2.1.10.9.13	Data Recording	--				X	
3.2.1.10.9.14	Test Mode	--				X	
3.2.1.10.10	Controller Position Configuration	--	X				
3.2.1.10.10.1	Configuration Command Entries	--				X	
3.2.1.10.10.2	Multiple Positions	--	X				
3.2.1.10.10.2.1	TCW	--				X	
3.2.1.10.10.2.2	TDW	--				X	
3.2.1.10.10.2.3	Data Display Devices	--				X	
3.2.1.10.10.3	Consolidation of TCPs	--	X				
3.2.1.10.10.3.1	Basic Consolidation	--				X	
3.2.1.10.10.3.2	Full Consolidation	--				X	
3.2.1.10.10.3.3	Limited Consolidation	--				X	
3.2.1.10.10.3.4	Consolidate All	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.10.10.3.5	Deconsolidation	--				X	
3.2.1.10.10.3.6	Consolidation Printout	--				X	
3.2.1.10.10.4	Additional Input Devices Associated With TCPs	--	X				
3.2.1.10.10.4.1	Coupling	--				X	
3.2.1.10.10.4.2	De-Coupling	--				X	
3.2.1.10.10.5	Sectorization	--	X				
3.2.1.10.10.5.1	Resectorization	--				X	
3.2.1.10.10.5.2	Partial Resectorization	--				X	
3.2.1.10.10.5.3	Sectorization Printout	--				X	
3.2.1.10.10.6	Training Mode - TCW	--				X	
3.2.1.11	Air Traffic Control Operational Data Display		X				
3.2.1.11.1	Controller Position Display Presentation	--				X	
3.2.1.11.2	Data Block Transformations	--	X				
3.2.1.11.2.1	Airspace Regions	--					X
3.2.1.11.2.2	Filters	--					X
3.2.1.11.2.3	Ident	--					X
3.2.1.11.2.4	Beacon Mismatch	--					X
3.2.1.11.2.5	Track - Blind Area	--					X
3.2.1.11.2.6	Departure Message Error	--					X
3.2.1.11.2.7	Transponder Indicators	--					X
3.2.1.11.2.8	Transponder Aural Alarm	--					X
3.2.1.11.2.9	Adapted Values	--					X
3.2.1.11.2.10	Automatic Data Block Force	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.11.2.11	Departure Acquisition Failure	--					X
3.2.1.11.2.12	Handoff	--	X				
3.2.1.11.2.12.1	Auto Handoff Display	--				X	
3.2.1.11.2.12.2	Distance Criteria	--				X	
3.2.1.11.2.12.3	Handoff Notification	--				X	
3.2.1.11.2.12.4	Handoff - Receiver	--					X
3.2.1.11.2.12.5	Handoff - Sender	--					X
3.2.1.11.2.12.6	Handoff Missing Track Update (TU)	--				X	
3.2.1.11.2.13	Unreasonable Mode C	--					X
3.2.1.11.2.14	Negative Altitude	--					X
3.2.1.11.2.15	Out of Sensor Coverage	--					X
3.2.1.11.2.16	Pointout	--				X	
3.2.1.11.2.17	Update Position from Interfacility Data	--					X
3.2.1.11.2.18	Search Only	--					X
3.2.1.11.2.19	Scratch Pad Display	--					X
3.2.1.11.2.20	Hold-Last Reported Position	--				X	
3.2.1.11.2.21	Track Non-Correlation	--					X
3.2.1.11.2.22	Track Non-Updating	--					X
3.2.1.11.3	Data Fields	--	X				
3.2.1.11.3.1	Data Fields - General	--					X
3.2.1.11.3.2	Aircraft Equipment	--					X
3.2.1.11.3.3	Aircraft Type	--					X
3.2.1.11.3.4	Aircraft Identification	--					X
3.2.1.11.3.5	Airport Identifier	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.11.3.6	Arrival Time	--					X
3.2.1.11.3.7	Controller Assigned Altitude	--					X
3.2.1.11.3.8	Assigned Beacon Code	--					X
3.2.1.11.3.9	Controller Entered Reported Altitude	--					X
3.2.1.11.3.10	Departure Time	--					X
3.2.1.11.3.11	Transponder Indicators	--					X
3.2.1.11.3.12	TCP Indicator	--					X
3.2.1.11.3.13	Entry Fix	--					X
3.2.1.11.3.14	Exit Fix	--					X
3.2.1.11.3.15	Flight Status	--					X
3.2.1.11.3.16	Ground Speed	--					X
3.2.1.11.3.17	Handoff Positions	--					X
3.2.1.11.3.18	Information Transfer	--					X
3.2.1.11.3.19	Data List Line Identifier	--					X
3.2.1.11.3.20	Mode C Altitude	--					X
3.2.1.11.3.21	Number of Aircraft in Formation	--					X
3.2.1.11.3.22	Pointout Indicator	--					X
3.2.1.11.3.23	Pointout Initiator	--					X
3.2.1.11.3.24	Reported Beacon Code	--					X
3.2.1.11.3.25	Requested Altitude	--					X
3.2.1.11.3.26	Safety Alerts	--					X
3.2.1.11.3.27	Safety Inhibits	--					X
3.2.1.11.3.28	Scratch Pad	--					X
3.2.1.11.3.29	Special Designators	--					X
3.2.1.11.3.30	Special Equipment Indicator	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.11.3.31	Special Position Indicator	--					X
3.2.1.11.3.32	Track Update Status	--					X
3.2.1.11.3.33	Mode 2 Indication	--					X
3.2.1.11.3.34	Hold	--					X
3.2.1.11.4	Display of Target Data	--	X				
3.2.1.11.4.1	Radar Coordinates	--		X			
3.2.1.11.4.2	Adaptable Data Block	--	X				
3.2.1.11.4.2.1	Data Block Types	--					X
3.2.1.11.4.2.2	Data Block Size	--	X				
3.2.1.11.4.2.2.1	Data Block Size-Minimum Definition	--					X
3.2.1.11.4.2.2.2	Data Block Size-Adaptable Parameters	--					X
3.2.1.11.4.2.3	Timeshare of Data Fields	--					X
3.2.1.11.4.2.4	Priority of Data Fields	--					X
3.2.1.11.4.2.5	Leader Line	--					X
3.2.1.11.4.2.6	Leader Line - Consolidation	--				X	
3.2.1.11.4.2.7	Adaptable Leader Direction	--					X
3.2.1.11.4.3	Display Presentation Modes	--	X				
3.2.1.11.4.3.1	Multiple Sensor Display	--					X
3.2.1.11.4.3.2	Single Sensor Ground Position	--					X
3.2.1.11.4.3.3	Single Sensor Slant Position	--					X
3.2.1.11.4.4	Digital Map Display	--					X
3.2.1.11.4.5	Weather	--	X				
3.2.1.11.4.5.1	Displayed Levels	--				X	
3.2.1.11.4.5.2	Targets in Weather	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.11.4.6	Quicklook Display	--				X	
3.2.1.11.4.7	Range Rings	--				X	
3.2.1.11.4.8	Altitude Restriction Display	--				X	
3.2.1.11.4.9	Geographic Restriction Display	--				X	
3.2.1.11.4.10	Display of Controller Aids	--	X				
3.2.1.11.4.10.1	CA/MCI	--					X
3.2.1.11.4.10.1.1	CA/MCI Visual Alerts	--					X
3.2.1.11.4.10.1.2	CA/MCI Aural	--					X
3.2.1.11.4.10.2	MSAW	--	X				
3.2.1.11.4.10.2.1	MSAW Visual	--					X
3.2.1.11.4.10.2.2	MSAW Aural	--					X
3.2.1.11.4.10.3	CRDA	--					X
3.2.1.11.4.10.4	CASA	--					X
3.2.1.11.4.10.5	FMA	--					X
3.2.1.11.4.10.6	Emergency Information	--				X	
3.2.1.11.4.10.7	Hospital Information	--				X	
3.2.1.11.4.11	Target Position	--	X				
3.2.1.11.4.11.1	Overlapping Coverage	--				X	
3.2.1.11.4.11.2	Reported Target Position	--					X
3.2.1.11.4.11.3	Tracked Position	--				X	
3.2.1.11.4.11.4	Target Position History	--				X	
3.2.1.11.4.11.5	Target Symbology	--	X				
3.2.1.11.4.11.5.1	Associated Targets	--				X	
3.2.1.11.4.11.5.2	Unassociated Target Symbol	--				X	
3.2.1.11.4.11.5.3	TCP Symbol	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.11.4.11.5.4	Parrot Display	--				X	
3.2.1.11.4.11.5.5	Permanent Echo	--				X	
3.2.1.11.4.11.5.6	Test Targets	--				X	
3.2.1.11.4.11.6	Target Extent Symbol	--				X	
3.2.1.11.4.11.7	Range and Heading	--				X	
3.2.1.11.5	Display of List and Tabular Data	--	X				
3.2.1.11.5.1	Display Coordinates	--				X	
3.2.1.11.5.2	Select/Inhibit	--				X	
3.2.1.11.5.3	Compass Rose	--				X	
3.2.1.11.5.4	Duplicate ACID	--				X	
3.2.1.11.5.5	Duplicate Beacon Code	--				X	
3.2.1.11.5.6	Display Presentation Mode	--				X	
3.2.1.11.5.7	Data Lists	--	X				
3.2.1.11.5.7.1	Adaptable	--					X
3.2.1.11.5.7.2	Data Lists - Inclusion/Exclusion	--					X
3.2.1.11.5.7.3	Data List Field Order	--					X
3.2.1.11.5.8	Preview Area	--	X				
3.2.1.11.5.8.1	Data Entry Contents	--				X	
3.2.1.11.5.8.2	Editing Prior to Entry	--				X	
3.2.1.11.5.8.3	Editing Erroneous Entry	--				X	
3.2.1.11.5.9	Error Message Area	--				X	
3.2.1.11.5.10	Readout Area	--				X	
3.2.1.11.5.11	Display Preference Information	--				X	
3.2.1.11.5.12	System Data	--	X				
3.2.1.11.5.12.1	Display	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.11.5.12.2	Future Definition	--				X	
3.2.1.11.5.12.3	Relocation	--				X	
3.2.1.11.5.12.4	Select - Inhibit System Data	--				X	
3.2.1.11.5.12.5	Status	--	X				
3.2.1.11.5.12.5.1	System Status	--					X
3.2.1.11.5.12.5.2	TCW Status	--					X
3.2.1.11.5.12.5.3	TCP Status	--					X
3.2.1.11.5.12.6	Unique General Information	--					X
3.2.1.11.5.12.7	Quicklook	--					X
3.2.1.11.5.12.8	Radar Source Identification	--					X
3.2.1.11.5.12.9	Data Recording	--					X
3.2.1.11.5.12.10	Sectorization Indicator	--					X
3.2.1.11.5.12.11	Date	--					X
3.2.1.11.5.12.12	Time	--					X
3.2.1.11.5.12.13	Altimeter	--					X
3.2.1.11.5.12.14	Alert Inhibits	--					X
3.2.1.11.5.12.15	ATIS	--					X
3.2.1.11.5.12.16	Consolidation Status	--					X
3.2.1.11.5.12.17	System Errors	--					X
3.2.1.11.5.12.18	Beacon Filter	--					X
3.2.1.11.5.12.19	Altitude Filter	--					X
3.2.1.11.5.12.20	Transponder Indicators	--				X	
3.2.1.11.5.12.21	Interfacility Status	--					X
3.2.1.11.5.12.22	Test Targets	--					X
3.2.1.11.5.13	Display of Coordination Information	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.1.11.5.13.1	Coordination Messages	--					X
3.2.1.11.5.13.2	Information Grouping	--					X
3.2.1.11.5.13.3	Information Ordering	--					X
3.2.1.11.5.13.4	Information Display	--					X
3.2.1.11.5.13.5	Unsent Coordination Data	--					X
3.2.2	System Operational Functions		X				
3.2.2.1	System Status Monitoring		X				
3.2.2.1.1	General Monitoring Requirements	--	X				
3.2.2.1.1.1	Monitor FSL Resources	--				X	
3.2.2.1.1.2	Monitor ESL Resources	--				X	
3.2.2.1.1.3	Automatic Status Data Acquisition	--					X
3.2.2.1.1.4	Automatic Failure Detection	--					X
3.2.2.1.1.5	MCP Failure Detection	--				X	
3.2.2.1.1.6	MCP Failure Tolerance	--				X	
3.2.2.1.2	Configuration Monitoring	--	X				
3.2.2.1.2.1	Hardware Component Status	--				X	
3.2.2.1.2.2	Software Component Status	--				X	
3.2.2.1.2.3	FSL Configuration Display	--				X	
3.2.2.1.2.4	ESL Configuration Display	--				X	
3.2.2.1.2.5	Function/Selection Display	--				X	
3.2.2.1.2.6	Current Time Display	--				X	
3.2.2.1.3	External System Interface Monitoring	--	X				
3.2.2.1.3.1	External Interface Status	--				X	
3.2.2.1.3.2	External Interface Failure	--					X
3.2.2.1.3.3	External Interface Error Rate	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.1.3.4	External Interface Error Detection	--					X
3.2.2.1.3.5	External Interface Status Display	--				X	
3.2.2.1.4	Radar Status Monitoring	--	X				
3.2.2.1.4.1	Radar Error Rate	--				X	
3.2.2.1.4.2	Radar Error Detection	--				X	
3.2.2.1.4.3	Radar Error Rate Display	--					X
3.2.2.1.4.4	Correction Factors Display	--				X	
3.2.2.1.4.5	Correction Factors Indication	--					X
3.2.2.1.4.6	Radar Maintenance View	--				X	
3.2.2.1.4.7	Permanent Echo/Parrot Display	--				X	
3.2.2.1.4.8	RTQC Message Display	--				X	
3.2.2.1.4.9	Status and Radar Identification Message Display	--				X	
3.2.2.1.5	Event Notification	--	X				
3.2.2.1.5.1	Alarm Condition Notification	--					X
3.2.2.1.5.2	Alert Condition Notification	--					X
3.2.2.1.5.3	Return-to-Normal Condition Notification	--					X
3.2.2.1.5.4	Error Condition Notification	--					X
3.2.2.1.5.5	Resource State Change Notification	--					X
3.2.2.1.5.6	Function Selection Notification	--					X
3.2.2.1.5.7	Notification Filtering	--					X
3.2.2.1.5.8	Notification Contents	--					X
3.2.2.1.5.9	Notification Display	--					X
3.2.2.1.5.10	Notification Retrieval	--					X
3.2.2.2	System Performance Monitoring		X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.2.1	Collection of Performance Data	--	X				
3.2.2.2.1.1	Computer Hardware Resource Utilization Monitoring	--	X				
3.2.2.2.1.1.1	Computer Hardware Resource Data Sampling Interval Adaptation	--					X
3.2.2.2.1.1.2	Processor Utilization	--			X		
3.2.2.2.1.1.3	Memory Utilization	--			X		
3.2.2.2.1.1.4	Network Utilization	--			X		
3.2.2.2.1.1.5	Monitor Depletion of Computer Hardware Capacity	--			X		
3.2.2.2.1.2	System Workload Monitoring	--	X				
3.2.2.2.1.2.1	System Workload Data Sampling Interval Adaptation	--					X
3.2.2.2.1.2.2	Track Storage Counts	--	X				
3.2.2.2.1.2.2.1	Associated Track Count	--					X
3.2.2.2.1.2.2.2	Unassociated Track Count	--					X
3.2.2.2.1.2.2.3	Remaining Track Capacity	--					X
3.2.2.2.1.2.3	Flight Plan Counts	--	X				
3.2.2.2.1.2.3.1	Maximum Flight Plan Count	--					X
3.2.2.2.1.2.3.2	Remaining Flight Plan Capacity	--					X
3.2.2.2.1.2.4	Target Report Counts	--	X				
3.2.2.2.1.2.4.1	Search Radar Target Reports Count	--					X
3.2.2.2.1.2.4.2	Beacon Target Reports Count	--					X
3.2.2.2.1.2.4.3	Beacon-Reinforced Radar Target Reports Count	--					X
3.2.2.2.1.2.5	Monitor Depletion of System Workload Capacity	--			X		
3.2.2.2.1.3	Traffic Statistics	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.2.1.3.1	Traffic Data Sampling Interval Adaptation	--					X
3.2.2.2.1.3.2	Airport Operations Counts	--					X
3.2.2.2.1.3.3	Instrument Operations	--					X
3.2.2.2.1.3.4	Adaptable Counts	--					X
3.2.2.2.2	Performance Data Statistics	--	X				
3.2.2.2.2.1	Performance Data Summarization	--					X
3.2.2.2.2.2	Interval Annotation	--				X	
3.2.2.2.2.3	Display	--					X
3.2.2.2.2.4	Upload	--					X
3.2.2.3	System Control		X				
3.2.2.3.1	General Control Requirements	--	X				
3.2.2.3.1.1	Initiate MCP Functionality	--					X
3.2.2.3.1.2	System Control Authority	--					X
3.2.2.3.1.3	Switch Control Authority	--					X
3.2.2.3.1.4	Manage Full Service Resources	--					X
3.2.2.3.1.5	Manage Emergency Service Resources	--					X
3.2.2.3.1.6	Control Software and Data Transfer	--					X
3.2.2.3.1.7	Initiate Diagnostic Tests	--					X
3.2.2.3.2	System Configuration Control	--	X				
3.2.2.3.2.1	Software Release Level Control	--					X
3.2.2.3.2.2	FSL Coldstart Control	--					X
3.2.2.3.2.3	ESL Coldstart Control	--					X
3.2.2.3.2.4	Resource Coldstart Control	--					X
3.2.2.3.2.5	FSL Warmstart Control	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.3.2.6	ESL Warmstart Control	--					X
3.2.2.3.2.7	Resource Warmstart Control	--					X
3.2.2.3.2.8	Control Automatic Recovery	--				X	
3.2.2.3.2.9	Resource Reconfiguration Control	--				X	
3.2.2.3.2.10	Partition Control	--				X	
3.2.2.3.2.11	Software Initiation	--				X	
3.2.2.3.2.12	Cut-Over	--				X	
3.2.2.3.3	External System Interface Control	--	X				
3.2.2.3.3.1	Interface State Transition	--				X	
3.2.2.3.3.2	Interface Data Flow	--				X	
3.2.2.3.3.3	Interface Diagnosis Test Initiation	--				X	
3.2.2.3.3.4	Data Distribution In Off-Line State	--				X	
3.2.2.3.3.5	Data Distribution In On-Line State	--					X
3.2.2.3.3.6	Radar Control	--	X				
3.2.2.3.3.6.1	Correction Factors Automatic Calculation	--					X
3.2.2.3.3.6.2	Correction Factors Calculation Initiation	--				X	
3.2.2.3.3.6.3	Generated Correction Factors Selection	--				X	
3.2.2.3.3.6.4	Manual Correction Factors Selection	--				X	
3.2.2.3.3.6.5	Correction Factors Discarding	--				X	
3.2.2.3.3.6.6	Radar Site Selection	--				X	
3.2.2.3.3.6.7	Restart Radar Processing	--				X	
3.2.2.3.3.6.8	Ring Around Beacon Target Suppression	--				X	
3.2.2.3.3.6.9	Reflected Beacon Target Suppression	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.4	Certification		X				
3.2.2.4.1	Resource Verification	--	X				
3.2.2.4.1.1	Off-line Resource Diagnostics	--				X	
3.2.2.4.1.2	Periodic Background Verification	--	X				
3.2.2.4.1.2.1	Hardware Component Verification	--					X
3.2.2.4.1.2.2	Operational Software Verification	--					X
3.2.2.4.1.2.3	Software Release Verification	--				X	
3.2.2.4.1.3	Background Verification Frequency Control	--					X
3.2.2.4.1.4	Resource Verification Initiation	--				X	
3.2.2.4.1.5	Display Of Verification Test Results	--					X
3.2.2.4.1.6	Verification Test Failure Notification	--					X
3.2.2.4.2	System Certification	--	X				
3.2.2.4.2.1	System Certification Test Initiation	--				X	
3.2.2.4.2.2	System Certification Tests	--				X	
3.2.2.4.2.3	System Certification Test Report Results	--					X
3.2.2.4.2.4	System Certification Test Report Content	--					X
3.2.2.4.2.5	System Certification Test Report Time Stamp	--					X
3.2.2.4.2.6	System Certification Test Report Display	--				X	
3.2.2.4.3	Service Certification	--	X				
3.2.2.4.3.1	Service Certification Test Manual Initiation	--				X	
3.2.2.4.3.2	Service Certification Workstation	--				X	
3.2.2.4.3.3	Simulated Radar and Flight Data	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.4.3.4	Service Certification Test Automatic Execution	--				X	
3.2.2.4.3.5	Service Certification Test Report Results	--				X	
3.2.2.4.3.6	Service Certification Test Report Deviation	--				X	
3.2.2.4.3.7	Service Certification Test Report Content	--				X	
3.2.2.4.3.8	Service Certification Test Report Time Stamp	--				X	
3.2.2.4.3.9	Service Certification Test Report Display	--				X	
3.2.2.5	Data Recording		X				
3.2.2.5.1	Recording Mechanism	--	X				
3.2.2.5.1.1	Continuous Recording	--					X
3.2.2.5.1.2	Recording Medium	--					X
3.2.2.5.1.3	Twenty-Four Hour Recording	--					X
3.2.2.5.1.4	Continuity During Changeover	--					X
3.2.2.5.1.5	Time Stamping	--					X
3.2.2.5.1.6	Data Storage Duration	--			X		
3.2.2.5.2	Data To Be Recorded	--	X				
3.2.2.5.2.1	Target Report Data	--					X
3.2.2.5.2.2	Tracking Data	--					X
3.2.2.5.2.3	Flight Plan Data	--					X
3.2.2.5.2.4	Interfacility Data	--					X
3.2.2.5.2.5	External Interface Data	--					X
3.2.2.5.2.6	Data Entry	--					X
3.2.2.5.2.7	Data Display	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.5.2.8	Performance Data	--					X
3.2.2.5.2.9	Notification Data	--		X			
3.2.2.5.2.10	Alarm/Alert Data	--					X
3.2.2.5.2.11	Error Data	--					X
3.2.2.5.2.12	Configuration Data	--					X
3.2.2.5.2.13	Security Data	--					X
3.2.2.5.2.14	System Data	--					X
3.2.2.5.2.15	Verification Results Recording	--				X	
3.2.2.5.2.16	Certification Reports	--					X
3.2.2.6	TCW Replay		X				
3.2.2.6.1	TCW Reconstitution	--					X
3.2.2.6.2	Replay Speed	--				X	
3.2.2.6.3	Select Replay Data	--				X	
3.2.2.6.4	Initiate Replay	--					X
3.2.2.6.5	Freeze Replay	--				X	
3.2.2.6.6	Reinitiate Replay	--					X
3.2.2.7	OCC Support Subsystem		X				
3.2.2.7.1	General Requirements	--	X				
3.2.2.7.1.1	Status Data Collection	--				X	
3.2.2.7.1.2	Performance Data Collection	--				X	
3.2.2.7.1.3	Data Entry Recording	--				X	
3.2.2.7.1.4	Remote Monitoring Data Recording	--				X	
3.2.2.7.1.5	Recording Mechanism	--				X	
3.2.2.7.1.6	Printout of Data	--				X	
3.2.2.7.1.7	Data Upload	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.7.1.8	OCC Resource M&C	--					X
3.2.2.7.1.9	Time Source	--				X	
3.2.2.7.2	Multi-Site Monitoring Requirements	--	X				
3.2.2.7.2.1	Remote Monitoring Activation	--				X	
3.2.2.7.2.2	Number of Monitored Sites	--					X
3.2.2.7.2.3	Multi-Site FSL Summary Display	--				X	
3.2.2.7.2.4	Multi-Site ESL Summary Display	--				X	
3.2.2.7.2.5	Multi-Site Event Notification Display	--				X	
3.2.2.7.2.6	Interface Status Display	--				X	
3.2.2.7.2.7	Alarm/Alert Condition Indication	--					X
3.2.2.7.2.8	OCC Remote Monitoring View	--				X	
3.2.2.7.3	Remote M&C	--	X				
3.2.2.7.3.1	Remote MCP Hosting	--					X
3.2.2.7.3.2	Remote MCP Selection	--				X	
3.2.2.7.3.3	Remote MCP Initiation	--				X	
3.2.2.7.3.4	Number of MCPs	--					X
3.2.2.7.3.5	Number of OCC Workstations	--					X
3.2.2.7.3.6	Remote MCP Delay	--					X
3.2.2.7.4	Remote Certification	--	X				
3.2.2.7.4.1	Certification from the OCC	--				X	
3.2.2.7.4.2	Service Certification Workstation	--				X	
3.2.2.7.5	NOCC System Interface	--				X	
3.2.2.8	Security		X				
3.2.2.8.1	General Security Requirements	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.8.1.1	FAA Order 1600.54B Controlled Access Protection	--			X		
3.2.2.8.1.2	FAA Order 1600.66 Information Protection	--			X		
3.2.2.8.1.3	Automation Subsystem Applicability	--			X		
3.2.2.8.1.4	Site Applicability	--			X		
3.2.2.8.2	Identification and Authentication	--	X				
3.2.2.8.2.1	Local Operators	--	X				
3.2.2.8.2.1.1	Availability of ATC Functions	--			X		
3.2.2.8.2.1.2	Identification and Authentication Activation	--				X	
3.2.2.8.2.1.3	Identification and Authentication For Non-ATC Operators	--				X	
3.2.2.8.2.1.4	Authenticate Local Users	--			X		
3.2.2.8.2.1.5	Change Authentication Information	--			X		
3.2.2.8.2.1.6	Passwords For Local Users	--					X
3.2.2.8.2.1.7	Authentication Upon Completion Of System Recovery	--					X
3.2.2.8.2.2	Remote Operators	--	X				
3.2.2.8.2.2.1	Authenticate Remote Operators	--					X
3.2.2.8.2.2.2	Disconnect Remote Workstation	--					X
3.2.2.8.2.2.3	Automatic Log-Off Remote Operator	--			X		
3.2.2.8.2.2.4	Remote Operator Recovery	--					X
3.2.2.8.2.3	Authenticate External Computers	--					X
3.2.2.8.3	Access Control	--	X				
3.2.2.8.3.1	Operators	--	X				
3.2.2.8.3.1.1	Control Access Between Subjects And Objects	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.8.3.1.2	Maintenance Of Operator Functions	--					X
3.2.2.8.3.1.3	Passwords For M&C Commands	--					X
3.2.2.8.3.2	Operator Classes	--	X				
3.2.2.8.3.2.1	Purpose	--					X
3.2.2.8.3.2.2	Nine Operator Classes	--					X
3.2.2.8.3.2.3	Assign User Functions To Operator Class	--					X
3.2.2.8.3.2.4	Multiple Operator Classes To Each Operator	--					X
3.2.2.8.3.3	External Systems	--	X				
3.2.2.8.3.3.1	Data Validation	--					X
3.2.2.8.3.3.2	Packet Filtering	--					X
3.2.2.8.3.3.3	Packet Filtering Of Attributes	--					X
3.2.2.8.4	Security Integrity	--	X				
3.2.2.8.4.1	Integrity Checks	--			X		
3.2.2.8.4.2	Integrity Anomalies	--					X
3.2.2.8.4.3	Message Integrity Checks For Security And Mission Critical Data	--			X		
3.2.2.8.5	Security Audit	--	X				
3.2.2.8.5.1	Create And Maintain Audit Trail	--					X
3.2.2.8.5.2	Traceability	--					X
3.2.2.8.5.3	Protection	--			X		
3.2.2.8.5.4	Security Audit Events	--					X
3.2.2.8.5.5	Select Audit Events	--					X
3.2.2.8.5.6	Minimum Security Audit Events	--					X
3.2.2.8.5.7	Audit Record Information	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.2.8.5.8	Identification And Authentication Audit Records	--				X	
3.2.2.8.5.9	View Audit Information	--				X	
3.2.2.8.5.10	Produce On-Line Reports	--				X	
3.2.2.8.5.11	Audit Report Reduction Filters	--					X
3.2.2.8.5.12	Security Alerts	--				X	
3.2.2.8.6	Security Administration	--	X				
3.2.2.8.6.1	Identification and Authentication	--	X				
3.2.2.8.6.2	Audit	--	X				
3.2.2.8.6.2.1	Audit Events	--					X
3.2.2.8.6.2.2	Audit Reports	--					X
3.2.2.8.6.3	Integrity	--	X				
3.2.2.8.6.4	Access Control	--	X				
3.2.2.9	Independent Time Source		X				
3.2.2.9.1	Synchronization	--				X	
3.2.2.10	System Operational Data Entry		X				
3.2.2.10.1	Entry of System Operational Function Data	--				X	
3.2.2.11	System Operational Data Display		X				
3.2.2.11.1	Display of System Operational Function Data	--				X	
3.2.2.11.2	Printout of System Operational Data	--				X	
3.2.2.12	ATC Operational Event Display		X				
3.2.2.12.1	Display	--				X	
3.2.2.12.2	Print	--				X	
3.2.2.12.3	Enable/Disable Notification	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3	System Support Functions		X				
3.2.3.1	Interfacility Test Function	--	X				
3.2.3.1.1	Message Testing	--				X	
3.2.3.1.2	Interface Testing	--				X	
3.2.3.1.3	Response Time Testing	--				X	
3.2.3.2	Simulation		X				
3.2.3.2.1	Target Generation	--	X				
3.2.3.2.1.1	Test and Training	--					X
3.2.3.2.1.2	Simulation Sensor Input	--					X
3.2.3.2.1.3	Primary Radar Data	--					X
3.2.3.2.1.4	Beacon Radar Data	--					X
3.2.3.2.1.5	Sensor Azimuth Data	--					X
3.2.3.2.1.6	Blip/Scan Ratio	--					X
3.2.3.2.1.7	Sensor Noise	--					X
3.2.3.2.1.8	Wind Conditions	--					X
3.2.3.2.1.9	Weather	--				X	
3.2.3.2.1.10	Wind Factors	--				X	
3.2.3.2.2	Simulation Modes	--	X				
3.2.3.2.2.1	Simulation Environment	--				X	
3.2.3.2.2.2	Training Mode	--	X				
3.2.3.2.2.2.1	Operational System	--				X	
3.2.3.2.2.2.2	Controller Training Interface	--				X	
3.2.3.2.2.2.3	Training Data	--				X	
3.2.3.2.2.2.4	Training Mode Workload	--				X	
3.2.3.2.2.3	Test Mode	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3.2.2.3.1	Non-Operational State	--				X	
3.2.3.2.2.3.2	Test Mode Workload	--				X	
3.2.3.2.3	Simulation Commands	--	X				
3.2.3.2.3.1	Target Characteristics	--	X				
3.2.3.2.3.1.1	Beacon Code	--				X	
3.2.3.2.3.1.2	Target Types	--				X	
3.2.3.2.3.1.3	Blip/Scan Ratio	--					X
3.2.3.2.3.1.4	Ident	--				X	
3.2.3.2.3.1.5	Noise	--				X	
3.2.3.2.3.1.6	Target Report Inhibit	--				X	
3.2.3.2.3.1.7	Report Quality	--				X	
3.2.3.2.3.2	Target Initiation and Termination	--	X				
3.2.3.2.3.2.1	Simulated Target Creation	--				X	
3.2.3.2.3.2.2	Duplicate Targets	--				X	
3.2.3.2.3.2.3	Terminate Target	--				X	
3.2.3.2.3.2.4	Inhibit Target Termination	--				X	
3.2.3.2.3.2.5	Auto Final Approach and Termination	--				X	
3.2.3.2.3.2.6	Abbreviated Auto Final Approach and Termination	--				X	
3.2.3.2.3.2.7	Ring of Targets	--				X	
3.2.3.2.3.3	Aircraft Movement	--	X				
3.2.3.2.3.3.1	Altitude	--				X	
3.2.3.2.3.3.2	Automatic Fix Descent	--				X	
3.2.3.2.3.3.3	Heading	--				X	
3.2.3.2.3.3.4	Holding	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3.2.3.3.5	No Gyro	--				X	
3.2.3.2.3.3.6	Speed	--				X	
3.2.3.2.3.4	Simulation Execution Control	--	X				
3.2.3.2.3.4.1	Simulation Entries	--				X	
3.2.3.2.3.4.2	Manual Entry	--				X	
3.2.3.2.3.4.3	Display Freeze	--				X	
3.2.3.2.3.4.4	Fast Time	--					X
3.2.3.2.3.4.5	Fast Time - Entries	--				X	
3.2.3.2.3.4.6	Scenario Enable/Disable by Target	--				X	
3.2.3.2.3.4.7	Scenario Initiate	--				X	
3.2.3.2.3.4.8	Scenario Termination	--				X	
3.2.3.2.3.4.9	Scenario Backup	--				X	
3.2.3.2.3.4.10	Simulated Sensors	--				X	
3.2.3.2.3.4.11	Training System Time	--				X	
3.2.3.2.3.4.12	Multiple Scenarios	--					X
3.2.3.2.4	Scenario	--	X				
3.2.3.2.4.1	Scenario Generation Tools	--				X	
3.2.3.2.4.2	Stored Scenario	--				X	
3.2.3.2.4.3	Scenario Storage	--				X	
3.2.3.2.4.4	Scenario-Manual Entry	--				X	
3.2.3.2.4.5	Aircraft Characteristics	--				X	
3.2.3.2.4.6	Default Value Override	--				X	
3.2.3.2.4.7	Capture Simulation Activities	--				X	
3.2.3.3	Data Reduction and Analysis (DR&A)		X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3.3.1	Selecting Data Reduction Information	--					X
3.2.3.3.2	Selection of Output Location	--					X
3.2.3.3.3	Data Reduction and Analysis Functions	--	X				
3.2.3.3.3.1	Summarization	--					X
3.2.3.3.3.2	Format Definition	--					X
3.2.3.3.3.3	Aircraft Track Plots	--					X
3.2.3.3.3.4	Charts and Graphs	--					X
3.2.3.4	On-Site Maintenance		X				
3.2.3.4.1	Utilities, Tools, and Diagnostics	--	X				
3.2.3.4.1.1	Software, Utilities and Tools	--					X
3.2.3.4.1.2	Hardware Diagnostics	--					X
3.2.3.4.1.3	Digital Map Utilities and Tools	--					X
3.2.3.4.2	Software Maintenance	--	X				
3.2.3.4.2.1	Software Evaluation	--	X				
3.2.3.4.2.1.1	Run Time Errors	--					X
3.2.3.4.2.1.2	Data Archive	--					X
3.2.3.4.2.2	Software Management	--	X				
3.2.3.4.2.2.1	Software Upload	--					X
3.2.3.4.2.2.2	Software Download	--					X
3.2.3.4.2.2.3	Data Upload	--					X
3.2.3.4.2.2.4	Data Download	--					X
3.2.3.4.2.2.5	On-Site Software Storage	--					X
3.2.3.4.3	Hardware Maintenance	--	X				
3.2.3.4.3.1	Cyclic Execution of Diagnostics	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3.4.3.2	Archive of Diagnostic Results	--		X			
3.2.3.5	Off-Site Maintenance		X				
3.2.3.5.1	General Maintenance Support	--	X				
3.2.3.5.1.1	Monitor	--				X	
3.2.3.5.1.2	Control	--				X	
3.2.3.5.1.3	Storage and Transfer	--	X				
3.2.3.5.1.3.1	Software Storage	--					X
3.2.3.5.1.3.2	File Transfer	--					X
3.2.3.5.2	Remote Maintenance Facilities	--	X				
3.2.3.5.2.1	Operational Support Facility (OSF)	--	X				
3.2.3.5.2.1.1	OSF Location	--		X			
3.2.3.5.2.1.2	OSF Autonomy	--				X	
3.2.3.5.2.1.3	OSF Maintenance Subsystem Configurations	--				X	
3.2.3.5.2.1.4	OSF SMC	--	X				
3.2.3.5.2.1.4.1	SMC Functionality	--					X
3.2.3.5.2.1.4.2	SCSC Access	--					X
3.2.3.5.2.1.4.3	OSF/SCSC Connectivity	--					X
3.2.3.5.2.1.4.4	Concurrent Operations	--				X	
3.2.3.5.2.1.4.5	Remote MCP	--				X	
3.2.3.5.2.1.5	OSF STC	--	X				
3.2.3.5.2.1.5.1	STC Functionality	--					X
3.2.3.5.2.1.5.2	Automation Subsystem Configuration Replication	--				X	
3.2.3.5.2.1.5.3	Display Reconfiguration	--				X	
3.2.3.5.2.1.6	Site Adaptation	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3.5.2.1.6.1	Site Adaptation Implementation	--					X
3.2.3.5.2.1.6.2	Site Adaptation Testing	--					X
3.2.3.5.2.1.6.3	Site Adaptation Configuration Management	--					X
3.2.3.5.2.1.7	New Software Releases	--	X				
3.2.3.5.2.1.7.1	New Software Release From SCSC	--					X
3.2.3.5.2.1.7.2	New Software Release To STARS Site	--					X
3.2.3.5.2.1.7.3	New Software Release Testing	--					X
3.2.3.5.2.1.7.4	OSF Software Storage	--					X
3.2.3.5.2.1.8	PTR Support	--	X				
3.2.3.5.2.1.8.1	PTR Identification	--					X
3.2.3.5.2.1.8.2	PTR Supporting Data	--					X
3.2.3.5.2.1.8.3	PTR Resolution	--					X
3.2.3.5.2.1.8.4	PTR Distribution	--					X
3.2.3.5.2.2	STARS Central Support Complex (SCSC)	--	X				
3.2.3.5.2.2.1	SCSC Location	--		X			
3.2.3.5.2.2.2	SCSC/OSF Connectivity	--				X	
3.2.3.5.2.2.3	Concurrent Operations	--				X	
3.2.3.5.2.2.4	Remote MCP	--				X	
3.2.3.5.2.2.5	SCSC Autonomy	--			X		
3.2.3.5.2.2.6	SCSC Maintenance Subsystem Configurations	--				X	
3.2.3.5.2.2.7	Software Development Configuration (SDC)	--	X				
3.2.3.5.2.2.7.1	SDC Functionality	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3.5.2.2.7.2	SDC Activities	--					X
3.2.3.5.2.2.7.3	System-Wide Adaptation	--					X
3.2.3.5.2.2.7.4	Software Baseline Validation and Distribution	--					X
3.2.3.5.2.2.7.5	SDC Software Storage	--	X				
3.2.3.5.2.2.7.5.1	Source Storage	--					X
3.2.3.5.2.2.7.5.2	Adaptation Storage	--					X
3.2.3.5.2.2.7.6	Software Configuration Management	--	X				
3.2.3.5.2.2.7.6.1	Application Software Configuration Management	--					X
3.2.3.5.2.2.7.6.2	CAS Configuration Management	--					X
3.2.3.5.2.2.7.6.3	Track Software Changes	--					X
3.2.3.5.2.2.7.6.4	Visibility of Software Changes	--					X
3.2.3.5.2.2.7.6.5	Authorization of Software Changes	--					X
3.2.3.5.2.2.7.7	Software Change Proposal (SCP) Support	--	X				
3.2.3.5.2.2.7.7.1	SCP Identification	--					X
3.2.3.5.2.2.7.7.2	SCP Development	--				X	
3.2.3.5.2.2.7.7.3	SCP Implementation	--					X
3.2.3.5.2.2.8	Field Support Configuration (FSC)	--	X				
3.2.3.5.2.2.8.1	FSC Functionality	--					X
3.2.3.5.2.2.8.2	Automation Subsystem Configuration Replication	--				X	
3.2.3.5.2.2.8.3	Hardware Discrepancy Report (HDR)	--				X	
3.2.3.5.2.2.8.4	COTS Hardware Configuration Management	--					X
3.2.3.5.2.2.8.5	PTR Support	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3.5.2.2.8.5.1	PTR Identification	--					X
3.2.3.5.2.2.8.5.2	PTR Database	--					X
3.2.3.5.2.2.8.5.3	PTR Supporting Data	--					X
3.2.3.5.2.2.8.5.4	PTR Resolution	--					X
3.2.3.5.2.2.8.5.5	Resolution Download	--					X
3.2.3.5.3	Software Maintenance Tools	--	X				
3.2.3.5.3.1	Development Tools	--	X				
3.2.3.5.3.1.1	Development Environment	--					X
3.2.3.5.3.1.2	Requirements Management Tool	--					X
3.2.3.5.3.1.3	CAS-Integration	--					X
3.2.3.5.3.2	Test and Release Tools	--	X				
3.2.3.5.3.2.1	Software Test and Validation	--					X
3.2.3.5.3.2.2	Distribution and Release	--					X
3.2.3.5.3.3	Configuration Management (CM) Tools	--	X				
3.2.3.5.3.3.1	Software CM	--					X
3.2.3.5.3.3.2	Adaptation CM	--					X
3.2.3.5.3.3.3	Simulation Scenario CM	--					X
3.2.3.5.3.3.4	System Backup	--					X
3.2.3.5.3.4	Diagnostic Tools	--	X				
3.2.3.5.3.4.1	Run Time Errors	--					X
3.2.3.5.3.4.2	Software Fault Analysis	--					X
3.2.3.5.3.4.3	Data Analysis	--					X
3.2.3.5.3.4.4	Simulation	--					X
3.2.3.5.3.5	PTR and SCP Tools	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.3.5.3.6	Site Adaptation Tools	--	X				
3.2.3.5.3.6.1	Site Adaptation Creation	--					X
3.2.3.5.3.6.2	Site Adaptation Test and Validation	--					X
3.2.3.5.3.6.3	Digital Map Format	--					X
3.2.3.5.4	Hardware Maintenance Tools	--	X				
3.2.3.5.4.1	HDR Identification/Resolution	--					X
3.2.3.5.4.2	Hardware Diagnostics	--					X
3.2.3.5.4.3	COTS Hardware Test and Verification	--					X
3.2.3.5.4.4	COTS Hardware Configuration Management	--					X
3.2.3.6	System Support Data Entry		X				
3.2.3.6.1	Entry of System Support Function Data	--				X	
3.2.3.7	System Support Data Display		X				
3.2.3.7.1	Display of System Support Function Data	--				X	
3.2.4	System Performance		X				
3.2.4.1	Workload		X				
3.2.4.1.1	Automation Subsystem Workload	--					X
3.2.4.1.2	Individual Data Display Workload	--					X
3.2.4.1.3	Simultaneous Data Display Workload	--		X			
3.2.4.1.4	SCSC/OSF Workload	--	X				
3.2.4.1.4.1	Software Change Proposals (SCPs)	--				X	
3.2.4.1.4.2	Program Trouble Reports (PTRs)	--				X	
3.2.4.1.4.3	Baseline Software Upgrades	--				X	
3.2.4.1.4.4	Incremental Software Upgrades	--				X	

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.4.2	Response Times and Update Rates		X				
3.2.4.2.1	Dependence on Workload	--	X				
3.2.4.2.1.1	Simultaneous	--			X		
3.2.4.2.1.2	Individual	--			X		
3.2.4.2.2	Response Time and Update Rate Definitions	--			X		
3.2.4.2.3	Response Times	--	X				
3.2.4.2.3.1	Data Entry Device Response Times	--	X				
3.2.4.2.3.1.1	Alphanumeric Input Devices	--					X
3.2.4.2.3.1.2	Pointing Device Actuation Response Time	--					X
3.2.4.2.3.1.3	Pointing Device Moving Response Time	--					X
3.2.4.2.3.2	ATC Operational Data Display Response Times	--	X				
3.2.4.2.3.2.1	Local ATC Data Display	--					X
3.2.4.2.3.2.2	Remote ATC Data Display	--					X
3.2.4.2.3.3	M&C Data Display Response Time	--	X				
3.2.4.2.3.3.1	Display of Single Site Event Notifications	--					X
3.2.4.2.3.3.2	Display of Multi-Site Event Notification	--					X
3.2.4.2.3.3.3	Display of Certification Report	--					X
3.2.4.2.3.3.4	TCW Replay Initial Response	--				X	
3.2.4.2.3.4	Command Processing Response Times	--	X				
3.2.4.2.3.4.1	Local TCP Request Response Times	--					X
3.2.4.2.3.4.2	Remote TCP Request Response Times	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.4.2.3.4.3	MCP Request Response Times	--					X
3.2.4.2.3.5	Interfacility Data Transfer Response Times	--	X				
3.2.4.2.3.5.1	Interfacility Message Transmission	--					X
3.2.4.2.3.5.2	Processing Received Interfacility Messages	--					X
3.2.4.2.3.5.3	Response to Interfacility Message	--					X
3.2.4.2.3.6	Service Certification Response Time	--					X
3.2.4.2.4	Update Rates	--	X				
3.2.4.2.4.1	Map Data Display Update Rate	--					X
3.2.4.2.4.2	Weather Map Update	--					X
3.2.4.3	Transition Times		X				
3.2.4.3.1	Service Level Transitions	--					X
3.2.4.3.2	Time For Switching Resources	--					X
3.2.4.3.3	Switching Application Software	--					X
3.2.4.3.4	Switching Adaptation Data	--					X
3.2.4.3.5	Automation Subsystem Initialization Times	--	X				
3.2.4.3.5.1	To ESL	--				X	
3.2.4.3.5.2	To FSL	--				X	
3.2.4.3.6	Recovery Times	--	X				
3.2.4.3.6.1	Recovery Time From Power Failure	--	X				
3.2.4.3.6.1.1	Time From Power Restored To ESL	--					X
3.2.4.3.6.1.2	Time From Power Restored To FSL	--					X
3.2.4.3.6.2	Recovery Time To Current Service Level	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.2.4.4	Tracking and Safety Algorithm Performance		X				
3.2.4.4.1	Displayed Target Position Accuracy	--					X
3.2.4.4.2	Tracking Performance	--					X
3.2.4.4.3	Conflict Alert Performance	--					X
3.2.4.4.4	Final Monitor Aid (FMA) Performance	--	X				
3.2.4.4.4.1	Runways	--					X
3.2.4.4.4.2	Aircraft	--					X
3.2.4.4.4.3	Tracked Target Deviations	--					X
3.2.4.4.5	MSAW Performance	--					X
3.2.4.4.6	CRDA Performance	--					X
3.2.4.5	Time Accuracy of Recorded Data		X				
3.2.4.5.1	Synchronization Accuracy	--				X	
3.3	System External Interfaces		X				
3.3.1	System External Interfaces - General	--	X				
3.3.1.1	External Interface Standards	--		X			
3.3.1.2	Interface Diagram	--		X			
3.3.2	Digital Surveillance Systems Interfaces	--	X				
3.3.2.1	Digital Surveillance Systems Interfaces - General	--	X				
3.3.2.1.1	Number of Digital Surveillance Systems Interfaces	--					X
3.3.2.1.2	Primary and Backup Digital Surveillance Systems Interfaces	--				X	
3.3.2.2	Terminal Surveillance Systems Interface	--		X			

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.3.2.3	En Route Surveillance Systems Interface	--		X			
3.3.3	Terminal/En Route Interfacility Interface	--	X				
3.3.3.1	Number of Terminal/En Route Interfacility Interfaces	--				X	
3.3.3.2	Terminal/En Route Interfacility Interface Characteristics	--		X			
3.3.4	Enhanced Traffic Management System (ETMS) Interface	--	X				
3.3.4.1	Number of ETMS Interfaces	--				X	
3.3.4.2	ETMS Interface Characteristics	--		X			
3.3.5	Independent Time Source Interface	--	X				
3.3.5.1	Number of Independent Time Source Interfaces	--				X	
3.3.5.2	Independent Time Source Characteristics	--		X			
3.3.6	Remote TDW Interface	--	X				
3.3.6.1	Number of TDW Interfaces	--				X	
3.3.6.2	Remote TDW Interface Protocol	--		X			
3.3.6.3	Remote TDW Interface Characteristics	--		X			
3.3.6.4	Remote TDW/Terminal Surveillance System Interface	--		X			
3.3.7	Remote Maintenance Interface	--	X				
3.3.7.1	Number of Remote Maintenance Interfaces	--		X			
3.3.7.2	Remote Maintenance Interface Connectivity	--				X	
3.3.7.3	Remote Maintenance Interface Protocol	--		X			

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.3.7.4	Remote Maintenance Interface Characteristics	--		X			
3.3.7.5	Remote MCP	--				X	
3.3.7.6	Software Upload/Download	--				X	
3.3.7.7	Data Upload/Download	--				X	
3.3.8	Remote Monitor and Control Interface	--	X				
3.3.8.1	Number of Remote Monitor and Control Interfaces	--		X			
3.3.8.2	Remote Monitor and Control Interface Connectivity	--				X	
3.3.8.3	Remote Monitor and Control Interface Protocol	--		X			
3.3.8.4	Remote Monitor and Control Interface Characteristics	--		X			
3.3.8.5	Remote MCP	--				X	
3.3.8.6	Remote TCP	--				X	
3.3.8.7	Data Upload/Download	--					X
3.3.9	Applications Interface Gateway	--	X				
3.3.9.1	Number of AIG Interfaces	--				X	
3.3.9.2	AIG Interface Connectivity	--				X	
3.3.9.3	AIG Interfaces Protocols	--		X			
3.4	System Internal Interfaces		X				
3.4.1	Internal Interfaces Protocol	--		X			
3.4.2	Internal Interface Characteristics	--		X			
3.5	System Internal Data Requirements (Not Applicable)		X				
3.6	Adaptation		X				
3.6.1	Operational Parameter Values	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.6.2	Adaptation Parameter Change Control	--					X
3.6.3	Adaptable Parameter Type	--					X
3.6.4	Parameter Value Defaults	--					X
3.6.5	Parameter Value Ranges	--					X
3.6.6	Parameter Value Validation	--					X
3.6.7	Parameter Value Validation Errors	--					X
3.6.8	Parameter Value Dependency Validation	--					X
3.6.9	Implementation of Site Adaptation Changes	--					X
3.7	Safety		X				
3.7.1	Personnel Safety	--	X				
3.7.1.1	Safety Features of System Equipment Design	--		X			
3.7.1.2	Radio Frequency/Microwave, X, and Laser Radiation Limits	--		X			
3.7.1.3	Noise Criteria	--	X				
3.7.1.3.1	Operational Areas	--				X	
3.7.1.3.2	Equipment Areas	--				X	
3.7.2	Hazardous Materials	--	X				
3.7.2.1	Toxic Hazards	--		X			
3.7.2.2	Gases	--		X			
3.7.2.3	Fumes	--		X			
3.7.2.4	Explosive Atmosphere	--		X			
3.7.2.5	Mercury	--		X			
3.7.2.6	Cadmium	--		X			
3.7.2.7	Glass Fiber	--		X			

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.7.3	Physical Safety	--		X			
3.7.4	Electrical Safety	--		X			
3.7.5	Cabling and Connections	--		X			
3.7.6	National Electrical Code Adherence	--		X			
3.7.7	Fire Resistance	--		X			
3.8	Physical Security Requirements (Not Applicable)		X				
3.9	System Environment		X				
3.9.1	Equipment in Conditioned Facility	--	X				
3.9.1.1	Air Filters	--		X			
3.9.1.2	TRACON Operating Conditions	--		X			
3.9.1.3	Tower Operating Conditions	--		X			
3.9.1.4	Electrostatic Discharge	--	X				
3.9.1.4.1	Service Interruptions Due to Discharge	--			X		
3.9.2	Thermal Design	--		X			
3.9.3	Non-Operating Conditions	--		X			
3.10	Computer Resources		X				
3.10.1	Processor Utilization	--			X		
3.10.2	Memory Utilization	--			X		
3.10.3	Physical Memory Expansion	--			X		
3.10.4	On-line Storage Utilization	--	X				
3.10.4.1	Available Space	--			X		
3.10.5	Network Utilization	--			X		
3.11	System Quality Factors						
3.11.1	Availability	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.11.1.1	STARS Automation Subsystem	--	X				
3.11.1.1.1	FSL Configuration	--	X				
3.11.1.1.1.1	ATC Operational Functionality	--			X		
3.11.1.1.1.2	System Operational Functionality	--			X		
3.11.1.1.1.3	System Support Functionality	--			X		
3.11.1.1.2	ESL Configuration	--			X		
3.11.1.2	OSF Maintenance Subsystem	--			X		
3.11.1.3	SCSC Maintenance Subsystem	--			X		
3.11.1.4	OCC Support Subsystem	--			X		
3.11.2	Reliability	--	X				
3.11.2.1	Single Point Of Failure	--		X			
3.11.2.2	First Site	--	X				
3.11.2.2.1	STARS Automation Subsystem	--			X		
3.11.2.2.2	Component	--			X		
3.11.2.3	Twentieth Site	--	X				
3.11.2.3.1	STARS Automation Subsystem	--			X		
3.11.2.3.2	Component	--			X		
3.11.3	Maintainability	--	X				
3.11.3.1	Corrective Maintainability	--	X				
3.11.3.1.1	Mean Repair Time	--			X		
3.11.3.1.2	Maximum Repair Time	--			X		
3.11.3.2	Preventive Maintainability	--	X				
3.11.3.2.1	Preventive Maintenance Frequency	--			X		
3.11.3.2.2	Preventive Maintenance Time	--			X		
3.12	Design and Construction		X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.12.1	Architectural		X				
3.12.1.1	Enhanceability	--		X			
3.12.1.2	Scalability	--			X		
3.12.2	Hardware		X				
3.12.2.1	General Hardware Constraints	--	X				
3.12.2.1.1	Connections	--	X				
3.12.2.1.1.1	Cable Connections	--		X			
3.12.2.1.1.2	Data Entry Device Connections	--		X			
3.12.2.1.1.3	Maintenance Equipment Connections	--		X			
3.12.2.1.2	Aural Signal	--			X		
3.12.2.1.3	Data Entry Device Replacement	--				X	
3.12.2.1.4	Graphics Processing Component	--	X				
3.12.2.1.4.1	Controller/Generator	--				X	
3.12.2.1.4.2	Graphics Characteristics	--			X		
3.12.2.1.5	Color	--				X	
3.12.2.1.6	Keyboard Physical Characteristics	--		X			
3.12.2.1.7	Touch Screen Physical Characteristics	--		X			
3.12.2.1.8	Alphanumeric Entry Devices	--	X				
3.12.2.1.8.1	Readability	--		X			
3.12.2.1.8.2	Configurations	--		X			
3.12.2.1.8.3	Self-Illuminated	--		X			
3.12.2.1.8.4	Illumination-Control	--		X			
3.12.2.1.9	Pointer Device	--	X				
3.12.2.1.9.1	Mouse Standards	--		X			

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.12.2.1.9.2	Trackball Standards	--		X			
3.12.2.1.10	Special Tools	--		X			
3.12.2.2	Terminal Controller Workstation	--	X				
3.12.2.2.1	Data Entry Devices	--	X				
3.12.2.2.1.1	Data Entry Set	--		X			
3.12.2.2.1.2	Multiple Data Entry Sets	--				X	
3.12.2.2.1.3	Device Failure	--				X	
3.12.2.2.2	Display Characteristics	--	X				
3.12.2.2.2.1	Ambient Light	--		X			
3.12.2.2.2.2	Resolution	--		X			
3.12.2.2.2.3	Usable Display Area	--		X			
3.12.2.2.3	TCW Physical Characteristics	--	X				
3.12.2.2.3.1	Dimensions	--		X			
3.12.2.2.3.2	Viewing Angle	--			X		
3.12.2.2.3.3	Mobility of TCW	--	X				
3.12.2.2.3.3.1	Mounting of TCW	--		X			
3.12.2.2.3.3.2	Turning Radius	--		X			
3.12.2.2.3.4	Movement Locking	--		X			
3.12.2.2.3.5	TCW Exhaust	--		X			
3.12.2.2.4	Workspace	--	X				
3.12.2.2.4.1	Adjustable Shelf	--		X			
3.12.2.2.4.2	Writing Space	--		X			
3.12.2.2.4.3	Writing Surface	--		X			
3.12.2.2.5	TCW Installation	--		X			

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.12.2.3	Monitor and Control Workstation (MCW)	--	X				
3.12.2.3.1	Data Entry Set	--		X			
3.12.2.3.2	Display Characteristics	--	X				
3.12.2.3.2.1	Resolution	--		X			
3.12.2.3.2.2	Usable Display Area	--		X			
3.12.2.3.3	Workspace	--		X			
3.12.2.3.4	MCW Installation	--		X			
3.12.2.4	Tower Display Workstation (TDW)	--	X				
3.12.2.4.1	Data Entry Devices	--	X				
3.12.2.4.1.1	Data Entry Set	--		X			
3.12.2.4.1.2	Multiple Data Entry Sets	--		X			
3.12.2.4.1.3	Dimensions	--		X			
3.12.2.4.2	Display Mounting	--				X	
3.12.2.4.3	Display Characteristics	--	X				
3.12.2.4.3.1	Contrast Ratio	--			X		
3.12.2.4.3.2	Resolution	--				X	
3.12.2.4.3.3	Usable Display Area	--		X			
3.12.2.4.4	Supplemental Display	--	X				
3.12.2.4.4.1	Supplemental Display Output	--				X	
3.12.2.4.4.2	Supplemental Display Characteristics	--	X				
3.12.2.4.4.2.1	Usable Display Area	--		X			
3.12.2.4.5	Collocated Tower TDW Installation	--		X			
3.12.2.4.6	Display and Data Entry Devices Installation	--		X			
3.12.2.5	General Purpose Workstation (GPW)	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.12.2.5.1	Data Entry Devices	--	X				
3.12.2.5.1.1	Data Entry Set	--		X			
3.12.2.5.1.2	Alphanumeric Entry	--		X			
3.12.2.5.2	Display Characteristics	--	X				
3.12.2.5.2.1	Resolution	--		X			
3.12.2.5.2.2	Usable Display Area	--		X			
3.12.2.6	Printers	--	X				
3.12.2.6.1	ASCII Printer	--		X			
3.12.2.6.2	Page Printer	--		X			
3.12.2.6.3	Plotter	--		X			
3.12.2.6.4	Printer Notification	--				X	
3.12.2.7	Independent Time Source Characteristics	--	X				
3.12.2.7.1	Independent Time Source Accuracy	--		X			
3.12.2.8	Hardware Maintenance	--	X				
3.12.2.8.1	Accessibility	--		X			
3.12.2.8.2	Serviceability	--	X				
3.12.2.8.2.1	Service Access	--			X		
3.12.2.8.2.2	LRU Replacement	--			X		
3.12.3	Software		X				
3.12.3.1	Open Systems Environment	--	X				
3.12.3.1.1	Data Management Services	--	X				
3.12.3.1.1.1	Data Dictionary/Directory Implementations	--		X			
3.12.3.1.1.2	Structured Query Language (SQL) Processors	--		X			

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.12.3.1.2	Human/Computer Interface Services	--		X			
3.12.3.1.3	Network Services	--		X			
3.12.3.1.4	Operating System Services	--		X			
3.12.3.1.5	Software Engineering Services	--	X				
3.12.3.1.5.1	Application Software Implementation Language	--		X			
3.12.3.1.5.2	C Language	--		X			
3.12.3.1.5.3	Ada Language	--		X			
3.12.3.1.5.4	Modification of Application Software	--		X			
3.12.3.2	Commercially Available Software (CAS)	--	X				
3.12.3.2.1	Unmodified CAS	--					X
3.12.3.2.2	Tailoring Documentation	--	X				
3.12.3.2.2.1	Entry Methods	--		X			
3.12.3.2.2.2	Parameters Defined	--		X			
3.12.3.2.2.3	Acceptable Values	--		X			
3.12.3.3	Utility Software Implementation Languages	--		X			
3.12.4	Firmware		X				
3.12.4.1	Application Firmware	--				X	
3.12.4.2	Reprogramming	--				X	
3.12.5	Electrical		X				
3.12.5.1	Electrical Wiring	--		X			
3.12.5.2	Alternating Current (AC) Supply Line - Circuits and Parts	--		X			
3.12.5.3	Circuit Protection	--		X			
3.12.5.4	Power Source	--		X			

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.12.5.5	Grounding, Bonding, Shielding, and Transient Protection	--		X			
3.12.5.6	Voltage	--		X			
3.12.5.7	Impact on Operations	--			X		
3.12.5.8	Electromagnetic Interference (EMI)	--		X			
3.12.6	Mechanical		X				
3.12.6.1	Connectors and Fasteners	--	X				
3.12.6.1.1	Cable Support	--		X			
3.12.6.1.2	Electrical Connectors	--		X			
3.12.6.1.3	Fasteners	--		X			
3.12.6.2	Enclosures	--	X				
3.12.6.2.1	Equipment Mounting	--		X			
3.12.6.2.2	Equipment Access	--		X			
3.12.6.2.3	Cable Access	--		X			
3.12.6.2.4	Finish	--		X			
3.12.6.3	Space	--	X				
3.12.6.3.1	TRACON Equipment Room	--		X			
3.12.6.3.2	Tower Equipment Room	--		X			
3.12.6.3.3	Storage Space	--		X			
3.12.6.4	Structural Integrity	--	X				
3.12.6.4.1	Structural Independence	--			X		
3.12.6.4.2	Structural Strength	--			X		
3.12.6.5	Weight	--	X				
3.12.6.5.1	Floor Loading	--		X			
3.12.6.5.2	Maximum Component Weight	--		X			

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.12.6.5.3	Total TCW Weight	--		X			
3.12.6.5.4	TDW Display Weight	--		X			
3.13	Personnel-Related Requirements		X				
3.13.1	Computer Human Interface (CHI)		X				
3.13.1.1	General	--	X				
3.13.1.1.1	Applicability	--			X		
3.13.1.1.2	Same CHI For Local and Remote ATC Workstations	--			X		
3.13.1.2	Data Entry	--	X				
3.13.1.2.1	General	--	X				
3.13.1.2.1.1	Propagate Data Changes To All Views	--			X		
3.13.1.2.1.2	Feedback Messages	--				X	
3.13.1.2.1.3	Unlimited Time For Entry Of ATC Commands	--				X	
3.13.1.2.1.4	Upper and Lower Cases Equivalent	--					X
3.13.1.2.1.5	Complete Command From A Single Device	--					X
3.13.1.2.2	Preview Commands	--	X				
3.13.1.2.2.1	Operator Confirmation Of Manually Entered Data	--					X
3.13.1.2.2.2	Capability To Clear A Command	--					X
3.13.1.2.2.3	Modify Command Under Composition	--					X
3.13.1.2.2.4	Automatically Clear Data Entry Feedback	--					X
3.13.1.2.2.5	Function Key Without Clear Command	--					X
3.13.1.2.3	Input Devices	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.13.1.2.3.1	Pointer Device	--	X				
3.13.1.2.3.1.1	Purpose	--					X
3.13.1.2.3.1.2	Method For Selection	--					X
3.13.1.2.3.1.3	Method for Selection and Entry	--					X
3.13.1.2.3.1.4	Feedback Of Pointer Device	--					X
3.13.1.2.3.1.5	Cursor Speed	--				X	
3.13.1.2.3.1.6	Relocation Of Cursor To Adaptable Location	--					X
3.13.1.2.3.1.7	Cursor Direction	--					X
3.13.1.2.3.1.8	Left Or Right Handed	--					X
3.13.1.2.3.2	Alphanumeric Device	--	X				
3.13.1.2.3.2.1	Simultaneous Keypress	--				X	
3.13.1.2.3.2.2	Feedback	--					X
3.13.1.2.3.3	Numeric Pad	--	X				
3.13.1.2.3.3.1	Physically Separated	--		X			
3.13.1.2.3.3.2	Enter Key	--					X
3.13.1.2.3.4	Function Keys	--	X				
3.13.1.2.3.4.1	Hard Function Keys	--			X		
3.13.1.2.3.4.2	Soft Function Keys	--					X
3.13.1.3	Display Output	--	X				
3.13.1.3.1	General	--	X				
3.13.1.3.1.1	Usability Of Data	--			X		
3.13.1.3.1.2	Insufficient Space Indication	--					X
3.13.1.3.1.3	Text Presentation	--				X	
3.13.1.3.1.4	Continuous Text	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.13.1.3.1.5	View Suppression	--					X
3.13.1.3.1.6	Resizing Radar Data Views	--				X	
3.13.1.3.1.7	Resizing Other Views	--					X
3.13.1.3.2	Alphanumeric List Data	--	X				
3.13.1.3.2.1	List Left-Justified And Vertical	--					X
3.13.1.3.2.2	Each Item New Line	--					X
3.13.1.3.2.3	Group Separators	--					X
3.13.1.3.2.4	Position Indication	--					X
3.13.1.3.3	Labels	--	X				
3.13.1.3.3.1	Views	--					X
3.13.1.3.3.2	Pages	--					X
3.13.1.3.4	Emphasis	--	X				
3.13.1.3.4.1	Information Coding	--					X
3.13.1.3.4.2	Consistent Coding Conventions	--			X		
3.13.1.3.4.3	Redundant Coding	--			X		
3.13.1.3.4.4	Color Coding	--				X	
3.13.1.3.4.5	Geographic Map Symbol Coding	--	X				
3.13.1.3.4.5.1	Shape Codes	--			X		
3.13.1.3.4.5.2	Size	--					X
3.13.1.3.4.6	Auditory Coding	--	X				
3.13.1.3.4.6.1	Redundant	--					X
3.13.1.3.4.6.2	Volume Adjust	--				X	
3.13.1.3.4.6.3	Signal Consistency	--		X			
3.13.1.3.4.6.4	Duration	--					X
3.13.1.3.4.6.5	Signal Meaning	--			X		

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.13.1.3.4.6.6	Frequency Of Auditory Signals	--			X		
3.13.1.3.4.6.7	Modulation of Auditory Signal	--			X		
3.13.1.3.4.6.8	Auditory Alert Volume	--					X
3.13.1.3.4.7	Blink Coding	--	X				
3.13.1.3.4.7.1	Purpose	--					X
3.13.1.3.4.7.2	Blink or Flash Period	--				X	
3.13.1.3.4.7.3	Adaptable Rate	--				X	
3.13.1.3.4.7.4	Remove Blink With Acknowledgement	--					X
3.13.1.3.4.8	Brightness Coding	--				X	
3.13.1.3.4.9	Size Coding	--	X				
3.13.1.3.4.9.1	Two Sizes	--					X
3.13.1.3.4.9.2	Adaptable	--				X	
3.13.1.3.5	Menus	--	X				
3.13.1.3.5.1	Unavailable Menu Option	--					X
3.13.1.3.5.2	Adaptable Order	--			X		
3.13.1.4	Monitor and Control	--	X				
3.13.1.4.1	General	--	X				
3.13.1.4.1.1	Applicable	--			X		
3.13.1.4.1.2	Adaptable Time Limits For MCP Input	--				X	
3.13.1.4.2	Data Entry	--	X				
3.13.1.4.2.1	Command Multiple Resources With Single MCP Input Action	--					X
3.13.1.4.2.2	Data Destruction	--					X
3.13.1.4.2.3	Positive Confirmation Prior To Data Destruction	--					X

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.13.1.4.2.4	Confirmation Inputs Set In Adaptation	--		X			
3.13.1.4.2.5	Reset Existing Aural And Visual Alarms	--					X
3.13.1.4.2.6	Reset Aural Alarm Independently	--					X
3.13.1.4.2.7	Context-Sensitive Menus	--					X
3.13.1.4.3	Display Output	--	X				
3.13.1.4.3.1	Views	--					X
3.13.1.4.3.2	Simultaneous Views	--					X
3.14	Training (Not Applicable)		X				
3.15	Logistics-Related Requirements (Not Applicable)		X				
3.16	Additional Requirements		X				
3.16.1	Installation and Transition		X				
3.16.1.1	Operational Impact	--	X				
3.16.1.1.1	Service Interruption Limitation	--		X			
3.16.1.1.2	No Service Interruption	--			X		
3.16.1.1.3	No Interference With Existing Operations	--			X		
3.16.1.1.4	No Impact To Current Configuration	--			X		
3.16.1.2	Transition Equipment RMA	--	X				
3.16.1.2.1	MTTR	--			X		
3.16.1.2.2	MTBF	--			X		
3.16.1.3	Transient Equipment	--			X		
3.16.2	Preplanned Product Improvement (P3I)		X				
3.16.2.1	Interfaces	--	X				
3.16.2.1.1	One-way Interface	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.16.2.1.1.1	General	--		X			
3.16.2.1.1.2	Use of the AIG	--				X	
3.16.2.1.1.3	Local Area Network (LAN)	--			X		
3.16.2.1.1.4	Multicast	--			X		
3.16.2.1.1.5	Data	--			X		
3.16.2.1.1.6	One-Way Interface Characteristics	--		X			
3.16.2.1.2	Two-way Interface	--	X				
3.16.2.1.2.1	General	--		X			
3.16.2.1.2.2	Interface Redundancy	--		X			
3.16.2.1.2.3	Use of the AIG	--				X	
3.16.2.1.2.4	AIG Interfaces Characteristics	--		X			
3.16.2.1.2.5	Fault Tolerance	--	X				
3.16.2.1.2.5.1	Automatic Failure Detection	--				X	
3.16.2.1.2.5.2	Automatic Reconfiguration	--				X	
3.16.2.1.2.6	Two-way Interface Security	--			X		
3.16.2.2	Specific P3I Capability Upgrades	--	X				
3.16.2.2.1	Surveillance System Enhancements	--	X				
3.16.2.2.1.1	Alternate Surveillance Message Formats	--	X				
3.16.2.2.1.1.1	ASTERIX	--	X				
3.16.2.2.1.1.2	Other Surveillance Message Formats	--	X				
3.16.2.2.1.2	Automatic Dependent Surveillance (ADS)	--	X				
3.16.2.2.1.2.1	ADS Processing	--	X				
3.16.2.2.1.2.2	ADS-Broadcast (ADS-B) Interface	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.16.2.2.1.3	Surveillance Processing Enhancements	--	X				
3.16.2.2.1.3.1	Use of Increased Precision	--	X				
3.16.2.2.1.3.2	Use of Surveillance File Numbers	--	X				
3.16.2.2.1.3.3	Tracking Enhancements	--	X				
3.16.2.2.1.3.3.1	Data Fusion	--	X				
3.16.2.2.1.3.3.2	System Weighting	--	X				
3.16.2.2.1.3.3.3	Exclusion of Sensors	--	X				
3.16.2.2.1.3.3.4	Time Utilization	--	X				
3.16.2.2.1.3.4	Automatic Barometric Pressure Updating	--	X				
3.16.2.2.1.3.4.1	Digital Altimeter Setting Indicator (DASI) Interface	--	X				
3.16.2.2.1.3.4.2	DASI Data Functions	--	X				
3.16.2.2.1.3.4.3	DASI Data Display	--	X				
3.16.2.2.2	Surface Separation	--	X				
3.16.2.2.2.1	Airport Movement Area Safety System (AMASS)	--	X				
3.16.2.2.2.2	Airport Surface Traffic Automation (ASTA)	--	X				
3.16.2.2.2.2.1	ASTA Interface	--	X				
3.16.2.2.2.2.2	ASTA Messages	--	X				
3.16.2.2.2.2.3	ASTA Functions	--	X				
3.16.2.2.3	Improved Weather Display	--	X				
3.16.2.2.3.1	Integrated Terminal Weather System (ITWS)	--	X				
3.16.2.2.3.1.1	ITWS Interface	--	X				
3.16.2.2.3.1.2	ITWS Messages	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.16.2.2.3.1.3	ITWS Functions	--	X				
3.16.2.2.3.2	ASR-9 Wind Shear Processor	--	X				
3.16.2.2.3.2.1	ASR-9 Wind Shear Processor Interface	--	X				
3.16.2.2.3.2.2	ASR-9 Wind Shear Processor Data Functions	--	X				
3.16.2.2.3.3	Terminal Doppler Weather Radar (TDWR)	--	X				
3.16.2.2.3.3.1	TDWR Interface	--	X				
3.16.2.2.3.3.2	TDWR Data Functions	--	X				
3.16.2.2.4	Data Link Communications	--	X				
3.16.2.2.4.1	Data Link Interface	--	X				
3.16.2.2.4.2	Data Link Messages	--	X				
3.16.2.2.4.3	Data Link Functions	--	X				
3.16.2.2.5	Separation Assurance Enhancements	--	X				
3.16.2.2.5.1	Precision Runway Monitor (PRM) Interface	--	X				
3.16.2.2.5.2	PRM Interface Control Document	--	X				
3.16.2.2.5.3	PRM Surveillance Data Functions	--	X				
3.16.2.2.5.3.1	PRM Data Functions	--	X				
3.16.2.2.5.3.2	PRM Data Latency	--	X				
3.16.2.2.5.3.3	PRM Surveillance Update Interval	--	X				
3.16.2.2.5.3.4	PRM Load	--	X				
3.16.2.2.6	Conflict Alert (CA) and Mode-C Intruder (MCI) Alert Enhancements	--	X				
3.16.2.2.6.1	CA and MCI Probability of Detection	--	X				
3.16.2.2.6.2	CA and MCI False Alarms	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.16.2.2.6.3	CA and MCI Use of Multisensor Tracking Features	--	X				
3.16.2.2.7	Terminal ATC Automation (TATCA)	--	X				
3.16.2.2.7.1	Center-TRACON Automation System (CTAS) Interface	--	X				
3.16.2.2.7.2	CTAS Messages	--	X				
3.16.2.2.7.3	CTAS Functions	--	X				
3.16.2.2.8	Traffic Management Enhancements	--	X				
3.16.2.2.8.1	Traffic Management Enhancements Interface	--	X				
3.16.2.2.8.2	Traffic Management Enhancements Messages	--	X				
3.16.2.2.8.3	Traffic Management Enhancements Functions	--	X				
3.16.2.2.9	Supplemental Flight Data Processing	--	X				
3.16.2.2.9.1	Flight Data Input/Output (FDIO)	--	X				
3.16.2.2.9.1.1	Replacement Alphanumeric Keyboard (RANK) Functions	--	X				
3.16.2.2.9.1.2	Cathode Ray Tube (CRT) Functions	--	X				
3.16.2.2.9.1.3	Replacement Flight Strip Printer (RFSP) Functions	--	X				
3.16.2.2.9.1.4	FDIO Interface	--	X				
3.16.2.2.9.2	Flight Data Processing (FDP)	--	X				
3.16.2.2.9.2.1	General	--	X				
3.16.2.2.9.2.2	Electronic Flight Data	--	X				
3.16.2.2.9.3	STARS/STARS Interfacility Interfaces	--	X				
3.16.2.2.9.3.1	Number of STARS/STARS Interfacility Interfaces	--	X				

TABLE 28 Verification Requirements Traceability Matrix (VRTM) (Continued)

SECTION 3 PARAGRAPH	REQUIREMENT TITLE	RQMT ID	VERIFICATION METHOD(S)				
			N/A	I	A	D	T
3.16.2.2.9.3.2	STARS/STARS Interfacility Interface Characteristics	--	X				
3.16.2.2.9.3.3	STARS/STARS Interfacility Interface Messages	--	X				
3.16.2.2.10	Free-Form Text	--	X				
3.16.2.2.11	TCP-Defined Airspace	--	X				
3.17	Packaging Requirements (Not Applicable)		X				
3.18	Precedence and Criticality of Requirements (Not Applicable)		X				